

RECORD

667
R
80

F.R. Forsberg
Field Book no 88.

All wpt¹

43571-43890

1st visit last night

2nd visit this morning

1000-1800 hrs - 800-1000 hrs M

(0.000 - 1.000)

1000

10-8 smallish

10-9 smallish

10-10 smallish

10-11 smallish

10-12 smallish

10-13 smallish

10-14 smallish

10-15 smallish

Collection and Field Note Book

No. 68

(March 31, 1963 - July 12, 1963)

(43571 - 43890)

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F.R. Forsberg
Field Books No 88.

All typed

43571-43890

+ w. photos start
roll 63-8



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2

Virginia

March 31 - 5 mi. n.w. Fairfax
 or s.e. of Chantilly Rolling land
Pinus virginiana woods
 with a patch of deciduous
 wood in it, mostly
Acer rubrum, a very few
Broussonetia and *Quercus sp.*
 Locally a few *Liquidambar*.

Evergreen herbs & dwarf shrub

- la *Lycopodium complanatum*
- lc *Mitchella repens*
- l *Polystichum acrostichoides*
- e *Chimaphila maculata*
- n *Goodyera pubescens*
- Antennaria parlinii

Shrubs

- Cornus florida*
- Vaccinium cf. atroccarum*
- Vaccinium cf. vaillantii*
- Viburnum acerifolium*
- Smilax glauca*
- l. *rotundifolia*
- Ilex opaca*

Panicum japonicum abundant
 in edges, sparse inside woods
 Large ant hill
 over 1 m. wide, 4-5 dm. high
 on edge of forest.

- c *Sclerobryum*
- c "Bartramia"
- ~~Edwardsia~~
- l *Polytrichum commune*

3

Mar. 31 - 4 1/2 mi. n.w. Fairfax
 Younger pine forest.
 Fairly dense.

Evergreen herbs

- l *Antennaria parlinii*
- l *Polystichum acrostichoides*
- n *Goodyera pubescens*
- n *Chimaphila maculata*
- n *Mitchella repens*
- c *Sclerobryum*
- c "Bartramia"
- la *Cladonia cf. rangiferina*
- n *Tiburonum acerifolium*
- o *Prunus serotina*
- e *Smilax rotundifolia*

4

1963 - Va - N.C. - Ga - Ala - Miss

April 16 - flight from Washington to Charlotte
20° at 10,000' def. 2:15
rather overcast.

If a landscape a pale brownish green, fully green. Visibility south of Washington poor.

3:10 many small fields with ravines & rough ground in forest. Fields mostly bare soil - furnish a pale to reddish. A few just turning green, 60-80% of ground bare.

3:28 landing - more woods & landscape green. Trees generally leafed out, but still light green. Tulips & oaks abundant, patches of pine.
3:32 landed.

open slopes covered by budyn are completely gray.

4:20 left Charlotte
Cinn. florida fully out, conspicuous.
Some small scattered hills, one perfect ~~spiral~~
rock shape, to west.

5

Power line right of way
nonly vegetates a raw eroded gash in landscape.
Dammed river very muddy.
South of Charlotte many more of fields are somewhat green, soil rare from almost white to red.
Proportion of wooded land varies considerably locally.

Conspicuous white trees in forests. *Cinn. florida*, vary from 0 to very abundant.

4:22 Conspicuous erosion scars, reddish, on open slopes and on ~~west~~ thin forest.

5:11 Passed a large granite dome - some sort of installation on top & railway straight up e. and side, Stone Mt.?

Circle for a time south of Atlanta. Much wooded country, but great amount of subdivision, industry, highway construction.

Trip Vicksburg-Dallas completely unsatisfactory due to poor visibility.

Dallas - Ft. Worth (1st. side)

Land west of Dallas is low, soil is dark, sloughs and ponds frequent, patches of woods, either dense or open forest, are frequent alternating with cultivated fields. Gallery forest along sloughs and rows of trees along roads and edges of fields. General landscape is green, all trees broad leaved.

Ft. Worth-Odessa

In great proportion the land west of Fort Worth seems to be pastured, with patches of wood, gallery wood along ravines, and frequent evidence of invasion by shrubs.

n.45 Westward the wood very rapidly disappear, a fair proportion (20-25%) of the land is cultivated.

Trees principally along ravines and streams, but not always even there.

Soil a variable tan to chocolate to bluish brown.

7.00

7.49

Possum
pigdom
foot?

7.52

arrowwood
wood is
now

9.59

9.58

Less cultivation, large open pasture. Then a big reservoir with considerable closed & open woods and savanna around it. Northwest of this an area of considerable cultivation, west of reservoir a complex of savanna gallery forest, and open to closed woods, showing a great deal of influence of old shallow ponds and meandering stream beds, but pattern obscure.

Then on N-W-S-E trending complex dendritic drainage a gully pattern alternating with strips of ~~pasture~~ grassland. Then more complex meander systems. The gully systems and meander systems wooded, sparsely to densely, generally trending N-W-S-E, with strips (or interfluves) of grass between them.

Westward soil becomes redder, woodland sparse, savanna and grassland more general, but much more evidence of invasion of shrubs in grassland.

Much uncultivation (30-40%) Meander system & much wood esp. gallery and open woodland.

- 10:00 Alternating strips of cultivation and irregular strips of open wood to savanna.
- 10:01 A fair sized river, n.-w.-e. with large conspicuous meanders. River with broad sandy, but not braided, bed. Little water. West of this country is generally grassland and savanna, and especially shrub savanna. The river swings strongly to left part north of course is dammed and forms a very complicated reservoir. Wooded land, mostly rather open, forms a mosaic with grass, the wood being in old meander systems, especially, and much sparser, varying to savanna and grass in interfluves. The directions of flow very confused now, tending n.e. toward reservoir. Much densely wooded land well north of course toward reservoir. Meander systems and ravines again tending north to n.w., general landscape is open past
- 10:05

10:10

10:11

10:12

10:13

10:14

10:16

10:17

- To open scrub with gallery wood along ravines and meanders.
- Arid of open to closed wood or scrub 80% or more, scattered cultivated patches.
- More grass westward. River no longer in sight still mostly open wood and savanna, becoming more grassy westward. Small muddy reservoir on course. Another well & n.n.t. but on only a small stream.
- General landscape is savanna with some dense enough to be open wood, some grass and some cultivation.
- Meander systems with gallery wood, but generally less open woods more savanna than farther east. Much evidence of erosion. Soil an orange red.
- Grassland to savanna, becoming sparser and with less trace of stream course and gallery westward.
- More savanna to open woodland. Cultivation locally

- 10:2 Savanna mosaics of grassland & savanna to open woods, some poor gallery wood, streams bending or to n.e. very open dendritic pattern, still with traces of old meanders but there not more muddy wooded, aspect drier westward. About 50% grass, 50% savanna with irregular meander pattern fairly general. Less savanna than mud savanna. Pattern now suggests erosional cutting down into flat bedded substratum with trees growing certain beds (photos here)
- 10:3 Few savannas but still some sort of fallen, form large cultivated areas. Cotton farming, cultivation predominant.
- 10:4 Very muddy medium size reservoir, with a large wooded area n.w. of it. Cultivation red soil west of it. Irregular pasture much eroded, savanna along course. Soil red.
- 10:5 10:6 10:7

- 10:8 Mosaics of eroded savanna and cultivation, cult. dominant north of course, savanna dominant, badly sheet eroded and red, along course.
- 10:9 10:10 10:11 10:12 10:13 10:14 10:15 10:16 10:17
- Mostly cultivated, perhaps Ebilen area? Narrow irregular strips of open forest to savanna along streams. Cultivation dominant but many irregular patches of open wood or savanna. Eroded strips along streams and very irregular escarpments, base open wood to savanna.
- Cultivation dominant, soil darker red to purple. A plateau with almost white soil, savanna & grass, surrounded by a more densely wooded very irregular escarpment. Dendritic drainage patterns, more densely wooded, characteristics of top of plateau. Bedding ~~very~~ quite noticeable. (Is this Edwards Plateau?) This continue, but becoming more cultivated and soil in cult. part red.

- similar, with sparse
irregular gullies, most
in ravines, some small
mesas.
Density of savanna varies
with degree of dissection.
Grassland to savanna along
course almost 100% cult.
To north, of course, coming
closer to course. Redding
shows in vegetation -
esp. in uneven distribution
of grass, along small
dendritic broad ravine
systems.
10.41 Mostly cultivated, savanna
and ^{non}gall. wood along stream
courses.
10.42 2/3 - 3/4 cult. with savanna.
Much more cultivation to
north of course. Soil red.
Quite green along stream.
Small reservoir - water
very dark but not muddy.
10.43 Savanna, some cultivation -
another small reservoir -
but muddy to north.
10.44 Mosaic of cultivation and
savanna. Savanna
near streams, sp. gall. wood -
along stream (no water in
these streams)
10.45 Sheet erosion to very bad.
Mostly savanna, less cult.

10.44

10.45

10.46

10.47

10.48

10.49

- Generally the cult. areas
are on middle of interfluvia
shallow dissection most
conspicuous, almost
entirely savanna, badly
eroded. Soil in eroded
areas tan to red.
Very narrow tightly
meandering stream
with water in it
along course. dendritic
tributary systems
all dry, savanna
general. Cultivation
to north.
Savanna on shallow -
ly dissected land. tree
lenses near bottom of
ravines esp. larger ones.
To north, a broad strip
of cultivation on red soil
paralleling this broad
strip of savanna on
dissected pale tan to
whitish soil. This
dissection very shallow
and rounded.
Large trees & small city
to north, on edge of cultivation.
Now large cult. areas
close to course. Fairly long
airpot with asphalt strip.
Extensive savanna
with scattered vernal pools.

- 10:53 Large cultivated area.
Large vernal pools - alkali flats & mostly in extensive savanna. Cult. savanna mosaic along course.
- 10:56 Savanna with a patch of barrens.
Then cultivation and a ~~town~~ town mostly cult. well brownish red soil.
- 11:00 Savanna with vernal pools and an elongated slough-like one several miles long m.s.e.
- Then large mosaic of cult. & ~~savanna~~ savanna.
- 11:02 To north mostly savanna with a few vernal pools, cult. plus some savanna along course. Broad strip of savanna well to north, cult. along course. Large tank farm ~~savanna~~
- 11:04 City prob. Midland, surrounded by ~~a~~ large mosaic of savanna and cult.
- To west around airport extensive savanna, some of it showing signs of former cultivation. Scattered vernal pools, some grasses in the savanna from areas the trees are

- gray, in other bright green. Here apparently Prosopis.
- 11:03 Landed at Midland-Odessa airport.
- 11:27 Left Midland for El Paso. Savanna - for some distance sand dune terrain. scattered dry vernal pools. Oil pumps locally. A few windmill with accompanying small ponds. Some scattered cultivation, esp. in a strip extending west along a road. Oil field to north. Trees become smaller and sparser westward.
- 11:30 ^{mid}
^{with} ^{11:30} oil fields become fairly general. small oil ponds. Country is a dry sparse savanna. Generally a gray mottled appearance, apparently due to small depressions with thin dry grass between slightly higher and bare ground. scattered vernal pool.
- 11:35 oil wells in geometrical arrangement over most of area.
- 11:37 No more oil wells along course but some to north. Generally savanna, vernal pools irregularly dist., vague

watercourses in depressions
trending n.e.-s.w., more densely
vegetated.

1140 scattered patches of pale
sand dune, very irregular.
Then a solid dune area,
partly active, partly stabilized
by vegetation.

1141 A more irregular oilfield.
with patches of reddish
sand dunes.

1142 Land becomes redder and
vegetation very sparse.
Oil field continues, still
sporadic.

1143 Oil field stops; irregular
sandy areas, savanna,
now regulated depressions
and some vernal pools.
reddish sparse shrub savanna
on desert.

1144 same but areas of vernal pools
rare, but along course
a dendritic drainage
pattern in a pale soil,
the watercourses dark
gray & greenish, not very
well defined, as though
more like elongate ponds
than streams, dry now.

1145 The become confused and
fade into ~~red~~ uniform
red shrub savanna or desert
local pale patches with

vernal pools.

Oil fields, in same desert
but very sparse white
soil areas with irregular
pattern of darker depressions.
These areas more extensive
but less distinct. oil
fields only in deserts.

1146 A winding river with
water and dark vegetation
in slightly braided
streamcourse roughly
following course unless
a dam and small reservoir
rob the Pecos, and
Red Bluff Reservoir.

W. of this some evidence
of former cultivation,
contour windbreaks, etc.
W. of this pale soil,
some darker stream
beds trending toward Pecos
curious pattern of
very pale depressions (or elevated)
(like elevations), twisted
and sinuous. Vegetation
mostly very sparse except
in occasional depressions
and water courses.

Except for these irregularities
the country is very uniform.
A few watercourses are sharper
and have a conspicuous gallery
scrub. Very sparse network roads.

1903 - Texas - ~~Pecos River~~

- 12:02 Very open extensive drainage system, rather dendritic trending toward Pecos, badl along course irregular scarps, mesas very small buttes.
- 12:03 Dissection increases notably as Guadalupe Mts. are approached. Watercourses become more numerous. Bedding off rock shows in sinuous line. Vegetation very scanty, more notable near watercourses. Many small mesas, buttes, slope up to crest and rather abrupt west scarp of a low ridge branching off to side from south promontory of Guadalupe Mts.
- 12:04 Rolling desert land, some small mts., desert veg. very sparse, few small, geometrical cultivated areas on east slope up from a large salt flat ~~a playa~~. The bottom of this is rather irregular with larger pools and a central dry lake, not very extensive.
- 12:12

Texas

- They, some low sand hills with shrubs (*Prosopis*?) A few small cultivated areas but mostly very flat pale desert Much cultivation locally in middle distance & north. Desert along course with very sparse veg. water courses trending toward dry lake, more heavily vegetated. scattered small pools in depression. mottled pattern of sand (?) and sparse veg. Possibly *Prosopis* sand dunes. Small check dams in water courses. Dry spots behind them. A few small bleak farms. Two small isolated mountains a large sharp topped butte in middle distance and others scattered northward. Along course extensive mottled pale desert prob. *Prosopis* sand dunes. Dendritic ill-defined drainage patterns converging eastward. Westernmost of buttes dark, flat topped in distance to north.
- 12:14
- 12:15
- 12:16
- 12:17
- 12:18
- 12:19

In distance, indistinct,
a high even ridge trending
east-west (apparently).

A highway parallels
course a bit to north.

12.13 A very low range of hill
rounded, cut in flat bed,
with slopes in concentric
irregular pattern.

More of this scattered
westward.

12.14 Another dark outlier or small
mt. in distance & null.
Low hills with concentric
bedding become more promi-
ent and larger.
Vegetation very sparse,
not much influenced
by bedding.

12.15 Depressions are sandy
and reddish. scattered
shrub. This more general
westward. No real hills.
Shrubs more and more
conspicuous. Must be
Prosopis. Perhaps this is
nearer to a random distribu-
tion than most vegetation.

12.30 (photos - b-w)

12.31 Descending to it from west
then certainly are Prosopis
sandunes.

Scale ~~too~~ uncertainty
makes it very difficult

To distinguish tree savanna
from shrub savanna
and tree desert from
shrub desert from the air,
unless both trees and
shrubs are present and
even then it is not too certain
unless size of one is known.

El Paso to Douglas
left 4 P.M.

fan and has the ^{wester} a very
steeply westward dipping
series of beds - dip westward
at least 90° sparse to
open shrub vegetation
on the dip slope, very little
on the east slope.

Desert alluvial fans
stretching down from
base of the Rio Grande -
here rather canalized
and a very unimpressive
area. Bottom land all
cultivated. Almost no
trees any more. West
side of mt. a vast
area of Prosopis sandunes.
the strip just above the
cult. land a pale grey
sand, beyond that a
tawny to almost reddish
sand. very uniform except
for a few small depressions

- with less vegetation.
1:19 Some small lava flows
in middle distance.
- 1:20 A low range of hills across
course, then a higher, elong.
of hills - shrub desert veg.
Then a darker landscape
of scattered low volcanic
cones, with craters still
evident though ^{mostly} eroded out
at one side. ~~the~~ darker
these probably brown.
red sand between them
no regularity to side that
is breached
- 1:21 Peddly sand, with only
a few small cones in
middle distance.
- 1:22 Irregular alluvial flats
and dune patches then
apparently desert - grassland
with irregular small
dune areas. Depressions appearing
slightly greenish, rest of
landscape tawny.
- 1:23 Some scattered areas of small
relief.
- 1:24 Scattered cult patches -
brown now.
- 1:25 Clump of mts. in distance
large area of ^{possibly} marshland?
padding into parallel
wash system running
into the dune areas.

1:31

1:32

1:34

1:35

1:36

1:37

1:38

1:40

1:42

1:44

1:46

- hilly areas - very sparse
shrub desert
- hills gradually aligned
into a more or less parallel
drainage system ~~for~~ trending
with course, more veg. in
washes. very spars on hills.
hills develop "cross-wipple"
pattern spread out, wash course
fewer, relief less
irregularly low-hilly.
hills get higher
veg. extremely sparse
These hill ~~area~~ always
northward from course
irregular dune areas
and general low relief
along course.
- elongate mesas and wide
watercourses (gray against
tawny landscape) trending
westward.
- dark hill in middle distance.
- several low ridges
trending more or less
with course
- Depression in distance with
some cultivation narrow
one extending from it
transverse to course - yellow
thinly yellowish with ~~some~~
a flowering herb, probably
Pectis or Spergula.
- We have been following

24

19, 3 Mexico Arizona

of railroad for some time.
In distance is a large
pale dry lake.

147 Ferre cultivation in
a belt south, part
mixed with areas of
low sand dunes.

148 Then a strip red-brown,
mottled landscape.
Then reddish washes
with shrubs, perhaps
Prosopis sand dunes.

149 A rough rocky range
of mts. with scattered
trees near tops. along
course. Trees may be
pinons.

150 Then another elongate
depression, with flats
and dune areas, excavated,
concave west.

151 Drainage pattern from
west running into this
in fan form.

152 Cult. area along course.
A high, very rocky
mountain range, wooded
in upper parts extending
far to north. Extensive
upland open forests &
scrub, very sparse along
course, where mts. are lower,
but valley bottoms well
wooded.

Arizona

25

This is quite extensive.
Strata of beds and
cuestas more or less
parallel to course, but
these beds not evident
farther north.

153 Relief becomes less
rugged but there is still
extensive open (pinon?) forest.
Relief gradually smooths
out into low hills and
forest disappears except
in ravines. Hill with sparse
scrub.

154 Another mountain range,
but much less rugged
and scarcely any
(sparse) forest in upper parts
mostly with irregular
scrub some scattered pinons (?)
Patch of mts. low hills
with an even sparse
scrub.

155 Patches of a dense gray scrub
or scrub forest. and large
patches of gray grass flat
esp. forming zones along
watercourses which are
in places incised into
them.

156 Irregular gray scrub,
patches of band
patches of sparse green scrub
(*Prosopis* or *Sparta*?) in middle
distance.

26

1963 Arizona

- 2.04 Sand dunes in Douglas.
Gray patches are a bunch
grass.
- 2.24 Left Douglas for Tucson.
Some cultivation in flat
valley bottom around Douglas.
Much dry grass land.
Fan slopes to east are
covered with an open sparse
scrub.
Dry grass in flat to north
very patchy, intermingles
with bare ground to
form a small moan.
Some cultivation scattered
to north in valley.
Rarely cultivated
but between 2 cult. sites
a low flat with what
looks exactly like tidal
channels.
West off this a fan slope,
scrub rather prominent on
this toward lower edges, but
very sparse farther up,
some grass in washes.
2.31 Patch of low gray hills
separated by red fan slopes.
Ground gets drier
considerably, but of hills
to m.e. with a range running
north from them.
Drainage runs west from
this. Sparse desert scrub on

27

- low relief.
Rocky range in distance to
n. e. and beyond it a
large dry lake.
Dissected fans on this
side of hills, with intricate
dendritic drainage pattern
outlined in dark shrubs
against a red soil.
Patch of white locally.
Crossed a dry river,
with cultivation on the
bottom lands. Some woods
areas along river.
Large dark wooded area
of bottom land.
Same sort of fan and
drainage pattern now
sloping east.
Much more wooded area
along this stream in
distance to m.e. Is this
americ?
- 2.33 Dark brown hills, not very
mogged.
A very high, rocky, forested
mountain mass to north
Chiricahua?
Another dry sandy
river, but running now,
with much dense scrub
eroded locally along it.
Rolling desert country.
Drainage n. w.
- 2.35

- 246 Desert laid out in streets.
no houses.
- 247 Shrub desert vegetation
in wavy braided lines
corresponding to washes.
- 248 Scattered small trees
Vegetation more and more
dense as Tucson is approached
more trees.
- 249 Parkinsonia & farrea are
dominant.
- 250 Landed at Tucson
- (2) 251 Left Tucson for Phoenix
Tucson is spread sparsely
over an enormous area.
Mts to west are not
high, but very rugged.
Mts to north (Catalina's)
are very high and well
wooded in the top 1/3 or 1/4.
- 252 Dissected fan with braided
washes n. w. of city. Being
built on. Wash in valley
bottom is occupied by golf course
- 253 Desert being subdivided.
Desert has closely scattered
trees as well as shrubs.
- 254 Drainage trends south,
washes empty from hills
and spread into distributaries
somewhat graded to very
much so. Marked by a
slight & notable increase in

- 255 Density of vegetation.
Pattern was clearly
dendritic. Interrupted
by occasional small
abrupt hills emerging
from the alluvium.
- 256 Drainage pattern and
vegetation both much
sparser and relief less.
Valley bottom very flat and
entirely cultivated.
- 257 Then a sharp small
range of bare mts. just
in course.
- 258 To north scattered hill
incl. a couple of old lava plugs.
- 259 Then a bare range of
very rocky mts. with the
small, & mostly.
- 260 Another flat cultivated
valley bottom. Some fields
green, others bar-
- 261 in middle distance an
area of marsh and standing
water, incl. a reservoir.
- 262 This cultivated valley is
very large. Some areas are
not farmed, have a
sparse irregular vegetation
strata & uncultivated.
- 263 Course adjusted once to mtns.
Most of cultivation left
behind. Very sparse veg.
& some bare hills.

Drainage trending N.E.

- 241 Hilltops very very sparse
cultivation in distance
another valley, same as above
but obviously much less
intensively farmed. Very
spotty.
- 242 Area of bare brown hills,
not sandy soil
another intensively cult.
flat valley. Some patches
of sparse irregular veg.
left perhaps sandy soil.
Cultivation becomes more
complete. Soil from a
pale tan to a peculiar
flesh pink. About $\frac{1}{3}$ of
fields green.
- 243 Passed over large city - Phoenix!
River has considerably water.
Large cut ahead - Phoenix
Bare rock down between
the two.

Phoenix - Chicago

1/2 hour out of Phoenix
a number of small fresh
lava flows, one coming
from the base of a small cone
with a crater.

Then a large mountain -
a huge breached cone
with a great lava flow
plateau to the north of it,
much eroded with a
detached fragment
some miles away across
a painted desert-like
eroding valley.

About 10 minutes later
crossed Rio Grande near
Albuquerque.

East of Albuquerque
a vast expanse of planted
mts with snow capped
peaks just S. most, many
areas of mountain vineyards

Then about 45 minutes
from Phoenix out in
plain, in the midst of
a vast mesa that is a
lava flow with broken off
edges & a circular cuesta
with a large eroded dome
in the middle, isolated from

Rocky Mt. front.

Northward about 5-7 minutes, and again out from the Rocky Mt. front in the plain is an extensive complex of old lava flows, small cones, etc stretching northeastward for a great distance - at least 10 min. flying time. The extent of very flat-topped mesa-land that is capped by lava flows is immense. Some of it is dissected and very intricate, but the original flow was very extensive. Now absolutely flat grassland.

After that the plain is mostly cultivated, with some areas, especially along rivers, of apparently unbroken grassland. Some without traces of former cultivation.

34

1963 Virginia

May 4 - Fairfax Co.
Arlington Blvd. just
n. of Pine Ridge

~~Carey & Cope~~
43571 *Antennaria parlinii*

On broad mowed
grassy area along road
formerly deciduous forest
with patches of *Pinus virginiana*.

3

35

Large colony spreading
by stolons, leaves white
beneath, bright green
above; style purple.
giving heads a
silvery purplish appearance.
No staminate plants seen
in the vicinity

May 12 Weems Creek

Natural Area

~~Connatilis~~

High ground on south
slope

all forest - *Fernodendron*,
Quercus prinus, *Fraxinus*
Americana, *Quercus*
coccinea, *Liquidambar*,
Quercus falcata,
Carya sp., *Prunus*
q. avium, *Quercus alba*,
Robinia pseudo-acacia
Quercus velutina

Understory of
Cornus florida, *Ilex*
opaca, some *Fagus*
Acer rubrum, *Carya* sp.
Magnolia sylvatica
Carpinus caroliniana,

Low shrub layer

Viburnum dentatum,
J. acerifolium, *Rhus*
typhina

Prunus serotina

Gindera benzoin

Corylus

Sambucus canadensis

herb layer

large colonies of *Podophyllum*
peltatum, much *Airaetis*
atropurpurea, some *A. trifolium*,
rare - *Polygonatum virginianum*

Allium vineale

Smilacina racemosa

Polystichum acrostichoides

ines

Lonicera japonica

abundant but not excessive

Vitis sp., *Smilax*
rotundifolia

Hedera helix.

This in places climbing
trees and forming a mat on
the ground.

Parthenocissus quinquefolia

areas near the slope to Weems Creek seem much more acid - with *Kalmia*, *Vaccinium*, *Rhododendron*, much less *Lonicera*, more *Viburnum acerifolium*. *Quercus prinus* and *Q. falcata* and *Pinus virginiana* become dominant. *Taxifera* seedlings.

Vaccinium stamineum, *V. vacillans* + *Gaultheria procumbens* become dominant ~~on the~~ in the low to dwarf scrub layer.

Pinus virginiana seedlings common in undergrowth but are not flourishing well.

Nyssa, *Amelanchier*, *Ilex*, *Kalmia* in a loose shrub layer.

The ground is almost bare of herbs, except a few grasses and *Carex*, but covered by a ~~carpet~~ of moss and lichens.

A few seedlings

Very large *Populus grandidentata*

A dry ravine in the tulip forest has abundant *Polypodium*, esp. on south side. *Boltonia*, *Lycopodium lucidulum*, *Thelypteris phegopteris*, *Cirsium heterophyllum*, ~~Osmunda cinnamomea~~ (?) young, *Lindera*, *Smilacina herbacea*, *Galium triflorum*, *Athyrium filix-femina*, *Hedera*, *Podosphaera*, *Phytolacca americana*, *Eupatorium rugosum*? *Oenothea*, *Arisaema triphyllum*, *Rhus toxicodendron*, *Fragaria*, *Polygonum* sp., *Rubus phoenicolasius*.

A tremendous tulip tree with many small holes in the lower part, and a large hole, 1-2 cm diam, with a funnel-shaped gnawed opening.

Scars like on our tulip from lessons.

Moss & ferns at edge of forest near highway, *Populus* + *Platanus* also

v = Labels
40
typed

1963 Maryland

May 12 - Weems Creek

Annapolis ~~not~~

in tall mature deciduous forest on fine gray-brown friable soil

43572 *Cynoglossum virginianum* L.

very local

✓ 73 *Prunus serotina* Ehrh.
occasional, mostly seedlings and small saplings.

✓ 74 *Dennstaedtia punctilobula* (Michx.) More
rare and local

✓ 75 *Viburnum acerifolium* L.
occasional, sterile.

✓ 76 *Viburnum recognitum* Fern.?
occasional, sterile.

✓ 77 *Lindera benzoin*
common, all seen sterile

✓ 78 *Sambucus canadensis* L.
very local, sterile.

✓ 79 *Smilax rotundifolia* L.
occasional

✓ 80 *Parthenocissus quinquefolia* (L.) Planch.
occasional, sterile.

✓ 81 *Quercus prinus* L.
occasional

✓ 82 *Hedera helix* L.
locally abundant

✓ 83 *Liriodendron tulipifera* L.
dominant tree

✓ 84 *Prunus avium* L.
common locally.

Anne Arundel Co.

41

buds unopened.

sapling 1 m. tall, prunin acid odor very strong.

shrub, 1 m. tall

shrub 1 m. tall

shrub 1.5 m. tall
aromatic when broken.
shrub, 1 m. tall.

scandent shrub.

vine.

tree 30 m. tall (these broad leaves are from a lower caudate branch, taken for record only)
forming a mat on the ground and climbing tree-trunks; sterile.
Tree 30 m. tall.

tall tree, bark brown with very large, long lenticels (this specimen from lower branches).

42

1963 Maryland

- ✓ 43585 *Rhus toxicodendron* L.
 ✓ 1 very common, all seen sterile.
- ✓ 16 86 *Acer rubrum* L.
 occasional
- ✓ 2 87 *Arisaema triphyllum* L.
 rare
- ✓ 5 88 *Arisaema atrorubens* (Ait.) Bl.
 common
- ✓ 2 89 *Fagus grandifolia*
 occasional in understory
- ✓ 1 90 *Uvularia perfoliata* L.
 rare
- ✓ 5 191 *Castanea dentata*
~~very rare, one suppressed
shrub seen.~~
~~rare, sprouts only seen.~~
- ✓ 1 92 *Juniperus virginiana*
 very rare, one seen.
- ✓ 1 193 *Euonymus*
 rare
- ✓ 5 94 *Cornus florida* L.
 abundant, dominant
understory tree
- ✓ 1 95 *Nyssa sylvatica* Marsh.
 occasional, shrubs and
small trees only, seen.
- ✓ 1 with 96 ^{l. p. 1963} *Sanicula*
~~occasional~~
- ✓ 1 97 *Lonicera japonica* Thunb.
 abundant
- ✓ 1 98 (fungus)
 parasitic on *Arisaema atrorubens*
- ✓ 1 99 *Ilex opaca* L.
 common in understory

Anne Arundel Co.

13

- low scandent shrub.
- small understory tree,
 sterile; leaves glaucous beneath,
 leaflets green beneath;
 spathe green to purplish.
- leaflets glaucous beneath,
 spathe green
- small tree, sterile.
- flowers pendent.
- small clumps of
 sprouts 1.5 - 2 m. tall;
 sterile.
- suppressed sapling
 0.7 m. tall, sterile.
- prostrate, sterile shrub.
- small tree, branches
 spreading, 5 m. tall.
- shrub 2 m. tall.
- sterile herb.
- vine forming a loose
 mat on ground where
 common or abundant; sterile.
 fruiting bodies orange.
- shrub 4 m. tall, sterile.

44 1963 Maryland

- ✓ 1 01 Botrychium virginianum
rare
- ✓ 2 01 Podophyllum peltatum
very common, forming
large colonies.
- ✓ 2 02 Polystichum acrostichoides
common locally (Michx.) Admst.
- ✓ 1 03 Fraxinus americana L.
occasional, large trees
rare.
- ✓ 1 04 Carpinus caroliniana Walt.
occasional in understory
- same. - in ravine
in deciduous forest
- ✓ 2 05 Osmorrhiza
occasional
- ✓ 2 06 Podophyllum peltatum L.
abundant
- ✓ 2 07 Adiantum pedatum L.
very local
- ✓ 2 08 Lycopodium lucidulum Michx.
very rare, on side of ravine
- ✓ 3 09 Athyrium filix-femina (L.) Roth
with Dowling
very rare in bottom of
- ✓ 1 ↓ 10 Smilax pulverulenta Michx.
rare
- ✓ 3 11 Botrychium virginianum (L.) Sw.
occasional
- ✓ 3 12 Thelypteris hexagonoptera (Michx.) Gray
very local
- ✓ 1 13 Thalictrum thalictroides
very rare

Anne Arundel Co.

15

spreading by subterranean
rhizomes; fruit very young.

sapling 2 m. tall.

small tree; trunk
muscular in appearance;
sterile.

roots with strong
licorice odor; flowers white.
spreading by subterranean
rhizomes; flowers white.

ponds almost ever.

evergreen; leaves lustrous;
flowers green, pointed.

roots fusiform; petals white.

46 1963 Maryland

43614 *Heuchera americana* L. var. *americana*
very local
in bottom of ravine

✓ 15 *Acer negundo* L.
rare

15 16 same, edge of forest along highway
Morus
rare

✓ 17 *Morus*
rare, with 43614, possibly
same clone.

✓ 18 *Prunus serotina* Ehrh.
rare

same - in rather thin
with P.B. Dowling open forest ~~or~~ near and
on slope above creeks

✓ 19 *Hieracium venosum* L.
occasional

✓ 20 *Bambusa canadensis* L.
occasional

✓ 21 *Quercus phellos*

✓ 22 *Lonicera rotundifolia* L.

✓ 23 *Alnus serrulata* Walld.
edge of water

✓ 24 *Galium aparine* L.
occasional

✓ 25 *Polygonatum biflorum* (Wall.) Ell.

✓ 26 *Smilacina racemosa* (L.) Desf.

✓ 27 *Galium triflorum* Michx.

✓ 28 *Silene caroliniana* Walt.

Anne Arundel Co.

47

erect, flowers green (petals
minute spatulate, white)
shrub; sterile.

shrub 2 m. tall; fruit
green. leaves rugose
above

~~with~~ shrub 2-3 m. tall,
leaves rugose above.

tree 7 m. tall, flowers white.

veins red; flowers yellow.

small tree

wine; flowers green
shrub.

buds cream-white.

sterile at this season.
petals dried.

48 1943 Maryland

- 4329 *Viburnum prunifolium* L.
✓ 30 *Rhododendron nudiflorum* L.
✓ 31 *Juglans nigra*
✓ 32 *Celtis occidentalis* L.
↑ 33 (grass)
coll. 34 *Kalmia latifolia* L.
edit. 35 common locally ~~common~~
✓ 35 *Viburnum acerifolium* L.
common locally
✓ 36 *Quercus Marylandica*
rare, on slope above water ^{Muench.}
✓ 37 *Pinus virginiana* Mill.
common
✓ 38 *Amelanchier arborea*
common
✓ 39 moss
abundant on otherwise bare soil
✓ 40 *Sassafras albidum* (Nutt.) Nees
occasional, saplings only.
✓ 41 *Vaccinium stamineum* L.
common
✓ 42 Carex
rare on open slope
✓ 43 *Viburnum acerifolium* L.
local ~~in~~ in undergrowth.
✓ 44 *Vaccinium vacillans* Torr.
common
✓ 45 ~~galls~~

Anne Arundel Co.

49

- shrub; fruits very immature.
shrub; flowers with a rather unpleasant odor,
tube deep pink, limb pale pink.
tree, (~~the~~ specimen from
lower caudine branchlet)
shrub.

shrub 1.5 m. tall, buds
pinkish
shrub 1 m. tall,
buds pinkish,
broken tree 20 cm. dbh.

sparse scraggly tree.
shrub 2.5 m. tall, sterile.

shrub 1 m. tall; sterile.
diffusely branched shrub
(m. tall; leaves glaucous
beneath; flowers white.

shrub 1.5 m. tall;
flowers white.
20-30 cm. tall, leaves glaucous
beneath, corollas whitish.

50 X 1963 Maryland

- ✓ 43645 *Gaylussacia baccata* (Wang.) K.Koch.
common, locally abundant
- ✓ 46 *Robinia pseudo-acacia* L.
locally common on lower
slopes just above water
- with fruiting
P.B. ✓ 47 *Diospyros virginiana*.
rare, one seen
- ✓ 48 *Rubus* sp. *argutus*
- ✓ 49 *Rubus phoenicolasius*
- ✓ 50 *Tipularia discolor*
- ✓ 51 *Oreoslea sensibilis* L.
abundant on small deltas
at mouth of ravines just above
water

Anne Arundel Co.

51

- shrub 30-40 cm. tall,
— flowers reddish green.
- shrub 1.5 m. tall, flowers
fragrant, raceme drooping,
calyx bronze, corolla white.
- sapling 1.5 m. tall.
- canes erect, flowers white.
- leaves white beneath.
- leaf purple beneath

May 18 - Wildcat Mt. Preserve
at east base of Watery
(Wildcat) Mt.

Young *Pinus virginiana*
forest, to about 4 m. tall,
with some admixture
of *Diospyros virginiana*
saplings. Density of
forest irregular, from
closed to somewhat open.

Plants seen

- a *Rubus* sp. cf. *flagellaris*
- o *Rubus* sp. cf. *argutus*
canes scrambling in pine.
- a *Desmodium* sp.
- c *Daucus carota* (2)
- c *Apoctynum cannabinum*
- o *Thossteum*
- o *Cercis canadensis*
- c *Fragaria*
- r *Viburnum prunifolium*
- o *Antennaria parlinii*
- o *Oxalis corniculata*
- o *Rosa* sp.
- o *Vitis* sp.
- o *Vitis* sp.
- o *Sassafras* (2 m)
- o *Parthenocissus quinquefolia*
- r *Crataegus* cf. *cus-galli*
- o *Cornus florida*
- r *Quercus* cf. *velutina*
- r *Rhus glabra*
- r *Ranunculus bulbosus*
- l *Antennaria plantaginifolia*

Pine forest 20-25 m. tall
on lower slopes. Spacing
3-5 m. but many trees
dead, either standing or
blown down, locally. In
these places forest very open,
here many very small
pine seedlings growing through
several inches of litter.

In one pine tree a crow's nest
with a fully feathered
young crow.

Plants seen

- d *Pinus virginiana*
- r *Pinus rigida*
- c *Sassafras albidum* (1-2 m)
- c *Carya* sp. (0.5-2 m.)
- o *Diospyros virginiana* (2 m)
- o la *Cornus florida* (2-4 m)
- o *Desmodium* spp.
- la *Parthenocissus quinquefolia*
- la *Lonicera japonica*
- o *Clematis* sp.
- o *Rubus* sp.
- o la *Rhus toxicodendron*
- o *Prunus serotina* (1 m.)
- r *Prunus* sp. (5 m)
- o *Cercis canadensis*
- o *Smilacina racemosa*
- l *Celastrus scandens*
- o *Rosa caroliniana*
- r *Botrychium virginianum*
- r *Uvularia sessilifolia*
- r *Cypripedium virginianum*
- r *Arisaema atrorubens*

54

1903 Virginia

- ~ *Fraxinus americana* (1-2m)
- ~ *Smilax rotundifolia*
- ~ *Smilax glauca*
- a *Galium pilosum*
- ~ *Galium aparine*

May 18 - Wildcat Mt. Reserve
open roadbank on top
of mountain

43652

Viola

v 1 in thin grass

v 1 53

Viola

in thin grass

same - in ^{old} pine forest at
east base of mountain

v 1 54 *Rhus toxicodendron* L.

very common on floor
of forest, ~~to~~^{old} stems
creeping under litter.

v 2 55 *Smilacina racemosa*
occasionalv 1 56 *Prunus*

rare

v 1 57 *Botrychium*
rarev 1 58 *Rosa*
occasionalv 1 59 *Chimaphila maculata*
commonv 1 60 *Uvularia sessilis*
rare, one tiny colony seen

Fauquier Co.

55

petals deep violet

petals pale violet.

stems creeping, extensive.
flowers yellow-green.

stem arching, leaves
appearing distichous,
flowers white.
sapling 1.5 m. tall; sterile.

shrub 40 cm. tall, fruit scarlet.
leaves dark green,
veins white above, purple beneath.
flower pale green.

- same - in young
Pinus virginiana stand 4 m.
 at east base of mountain
- 43661 *Antennaria plantaginifolia*
 ✓ 1 very local
- ✓ 2 62 *Crataegus crus-galli*
 rare
- ✓ 3 63 *Antennaria parlinii*
 very local
- ✓ 1 64 *Ranunculus bulbosus* L.
 rare
- ✓ 2 65 *Rosa*
 occasional
- ✓ 1 66 (fungus)
 parasitic on *Rubus* (43667)
- ✓ 1 67 *Rubus*
 common
- ✓ 3 68 *Vaccinium stamineum*
 rare
- ✓ 3 69 *Rubus*
 occasional
- ✓ 1 70 *Carex*
 rare
- ✓ 3 71 *Rubus*
 occasional in ~~scrubbing~~
- same - in small clearing
- ✓ 2 72 *Ranunculus bulbosus* L.
 occasional in grass
- ✓ 1 73 *Lesqyriodium*
 rare
- ✓ 1 74 *Rubus*
 occasional
- ✓ 1 75 *Rubus*
 occasional

tall

- spreading by rhizomes,
 only staminate plants seen.
- shrub 2 m. tall; sterile.
- spreading by rhizomes,
 only pistillate plants seen.
 petals yellow.
- shrub almost 1 m. tall, almost
 unbranched; bud only.
 bright orange.
- flowering branchlets erect.
- shrub 1 m. tall, flower white.
- ~~canes~~ canes erect, to 1 m. tall
- opposite, flowers white.
 culms spreading.
- canes ascending to 1 m.,
 then scrambling in pine
 branches; petals white.
- petals yellow; hair ~~down~~
 at base of stem.
- flower bluish
- canes ascending, flower white.
- canes ascending, flower white.

58

1961.3 Virginia

- 43676 *Seneckia*
" occasional
" 77 *Rubus*
 occasional
" 78 *Priostemum perfoliatum*
 occasional
15 79 *Potentilla*
 common
" 80 *Rubus*
 rare
" 81 *Plantago virginiana*
 common in bare soil in paths
 same - cleared roadsides
" 82 *Rubus*
 ~~common~~, common
14 83 *Fragaria*
 very common
12 84 *Poa compressa*
 common
" 85 *Galium aparine*
 occasional
15 86 *Rubus*
 common

with few

- P.B. Dow
↓ 87 *Dryopteris marginalis*
" 88 *Anemone & Thalictrum thalictroides*
" 89 *Oxalis corniculata*
" 90 *Botrychium virginianum*
" 91 *Polygonatum biflorum*
" 92 *Zizia?*

Fauquier Co.

59

heads yellow.

canes ascending; flowers white.

erect; flowers carmine or
light maroon.stems almost erect,
petals bright yellow.
slightly emarginate.
canes erect, flowers white.canes low, tending
to elongate and root at
tips; petals white.
fruit almost ripe.

bluish green

stems erect but weak.

stems almost prostrate,
tending to root at tips,
flowering branchlets ascending,
petals white.petals white & green.
petals yellow.flowers white with green tips.
flowers yellow

60

1963 Virginia

May 18 - 4.5 mile south

of Gainesville

43693 *Isatis tinctoria* L.

common very locally
on remnant of small
hill between lanes of highway

Prince William Co.

61

flowers yellow; fruit
immature.

May 19 - Scientists' Cliffs

Laurel Preserve

Dissects area of mixed *Quercus prinus*, *alba*, *rubra*, *Acer rubrum*, some *Pinus virginiana* and *P. rigida*, with a dense understory of *Kalmia latifolia*, some *Ilex opaca*.

^{Corp of} *Garrett* is opening this up along the road, taking out some to all of the trees to encourage the laurel.

In ravines the *Kalmia* reaches 5 m tall, 20 cm + dbh. Some is in bloom but mostly in bud.

May 19 Hellen Creek Preserv

A small ground fire burned along the brink of the escarpment above the road some weeks ago. A few saplings *Ilex* and seedlings of various other trees killed. In one area a number of larger pines are killed.

The slope above the tributary on west boundary was burned, not heavily enough to burn trees, but the *Kalmia* is dead to the ground and not sprouting yet.

In the flat bed of the tributary, a tangle of *Smilax rotundifolia*, the smilax is killed to the ground but there are some sprouts to 30 cm.

On top, in old field, most of saplings were killed to ground. *Vaccinium*, *Nyssa*, *Prunus serotina*, *Campus*, *Rhus copallina* are all sprouting.

May 19 - Hellen Creek Preserve

in second-growth mixed
deciduous forest

✓ 1 43694 *Epifagus*
occasional under large
beech tree

✓ 2 95 *Pyrus malus* L.
near old ruined house

✓ 3 96 *Pyrus communis* L.
near old ruined house

✓ 4 97 *Asplenium platyneuron* (L.) Oakes
abundant locally

✓ 5 98 *Vaccinium stamineum*
rare

✓ 6 99 *Kalmia latifolia*
common locally, forming
an undergrowth.

✓ 700 *Crataegus*

see in
same - in open
Pinus virginiana woods

✓ 8 700 *Crataegus*
rare

✓ 9 701 *Ilex opaca* L.
common

✓ 10 02 *Lepidium*
very local in path

✓ 11 03 *Arabis lyra* ?
very local

✓ 12 04 *Gaylussacia frondosa*
rare

small, very gnarled
tree, fruits immature.
shrub, branches tend to
turn downward; sterile.
- fertile fronds strictly
erect, sterile depressed.
shrub, m. tall; flowers
white.
shrub 2 m. tall; flowers
very pale pink; anthers
very dark maroon.

shrub 1.5 m. tall, ~~flowers~~
white, filaments white,
- anthers purple.

shrub 3 m. tall; flowers
white (staminate), fragrant.
erect.

slender shrub 0.7 m. tall,
flowers ~~orange~~ pinkish.

- with
P.B. Dowling
- same - in marsh
along stream
- ✓ 43705 *Scirpus*
- ✓ 1 06 *Osmunda regalis*
- ✓ 2 07 *Crataegus*
in edge of marsh
- ✓ 1 08 *Rosa palustris*
- ✓ 1 09 *Carex*
- ✓ 1 10 *Carex*
- ✓ 2 11 *Carex*

Bowens
May 19 - near Bowens
3 mi. s.w. of Prince Frederick
in sandy soil along
road.

- ✓ 3 12 *Coreopsis*
abundant along road
and in dwelling yard,
probably naturalized.
- ✓ 4 13 *Tephrosia virginiana*
common

stems terete

shrub; petals and filaments
white; anthers purple.

shrub; fruit red.

caespitose.

rays bright chrome
yellow, disk deeper yellow.

caespitose, stems
strongly ascending,
corolla with standards
pale green, wings rose
pink, keel bronze.

May 26. - Great Falls Park

Swampy land with
Acer rubrum, *Liriodendron*,
Quercus palustris, *Ulmus americana*,
in tree layer about 30 m.

Shrub layer 2-3 m.

- ^a *Cornus flava*
- ^a *Viburnum dentatum*
- ^a *Lambucus canadensis*
- ^a *Ilex verticillata*?
- ^a *Asimina*
- ^a *Herb layer*
- ^a *Symplocarpus foetidus*
- ^{c la} *Podophyllum peltatum*
- ^a *Viola*
- ^c *Ranunculus abortivus*
- ^a *Anemone trifolium*
- ^a *Carex*
- ^c *Carex stipata*
- ^a *Carex*
- ^a *Medeola virginiana*
- ^c *Polystichum acrostichoides*
- ^c *Dryopteris cristata*
- ^c *Dryopteris "spinulosa"*
- ^a *Galium triflorum*
- ^a *Oenothera sensibilis*
- ^a *Smilacina racemosa*
- ^a *Athyrium filix-femina*
- ^c *Bachmania cylindrica*
- ^c *Cinna arundinacea*
- ^c *Lysimachia ciliata*
- ^a *Carex radiata*
- ^a *Gernia sp. ?*

vines

- ^a *Lonicera japonica*
- ^c *Rhus toxicodendron*
- ^c *Smilax rotundifolia*
- ^c *Parthenocissus quinquefolia*

They have just cut a
60 ft swath across this for
the Difficult Run sewer.
The soil is a black heavy
clay. They are filling
in here with broken rock.
A 1 ft tile lets water through
the fill.

This crosses and makes
a right angle turning
up the river. The 60 foot
swath skirts the edge of
the swamp, more or less
following the road.

Part of this has just been
cleared, part not yet.

In flower - not in swamp

- Kalmia latifolia*
- Lyonia ligustrina*
- Vaccinium neglectum*
- Chelidonium minus*?

May 26 - Great Falls Preserve
in Acer rubrum swamp

- ✓ 43714 14 *Ranunculus abortivus*
✓ 2 very common
✓ 15 15 *Carex*
rare
✓ 16 16 *Cardamine*
rare
✓ 17 17 *Viola cucullata* Ait.
occasional
✓ 18 18 *Dryopteris "spinulosa"*
common
✓ 19 19 *Carex*
rare
✓ 20 20 *Dryopteris cristata*
common
✓ 21 21 *Arisaema triphyllum* L. (n. st.)
very local
✓ 22 22 *Carex cf. stipata*
common
same - in deciduous
woods ~~near~~ on gentle slope
✓ 23 23 *Hieracium venosum*
occasional in rocky ground
✓ 24 24 *Viburnum acerifolium* L.
very common
✓ 25 25 *Chionanthus virginiana*
very local
✓ 26 26 *Carex*
common

erect or almost so.

culms spreading; herbage
very slightly glaucous.
flowers white

flowers light violet

small tufts, culms
ascending.
ponds erect

sheaths and petioles
mottled, leaves not
glaucous beneath,
inside of spathe limb
almost black.

loose tufts, culms
spreading.

leaf veins reddish,
flowers yellow.
shrub 1-2 m. tall,
flowers white.
shrub 3 m. tall.

Tufted, culms weak.

72

1963 Maryland

June 1 - Scientists' cliffs
on earth cliff along trail
just above bay shore

- ✓ 43727 *Equisetum hiemale* L.
dense patch on seepy
area near base of cliff
✓ X 28 *Luzula*
common on more open parts
of bank

June 2 - Scientists' cliffs
in mixed deciduous
forest on flat ground

- X 29 *Dennstaedtia punctilobula*
occasional
X 30 *Thelypteris noveboracensis*
locally common
X 31 *Hedysarum purpureum* (L.) T. & G.
rare

June 5 - Scientists' cliffs
(near glass house)
on slopes of ravine
in deciduous second-growth forest

- ✓ 32 *Luzula bulbosa*
common
✓ 33 *Polystichum acrostichoides*
locally abundant
X 34 *Carex*
locally common
X 35 *Mitchella repens*
very local
X 36 *Bryum minium cuspidatum* Hedw.
local

Calvert Co.

73

densely caespitose, stems
strictly erect.

tufts, culms spreading
ascending.

rhizomes prostrate, buried
forming patches, rhizomes
prostrate, buried.
flowers lavender

tufted, culms spreading.

loose tufts, culms
weak, almost procumbent.

forming local cushions.

- same - flat ground
on bottom of ravine
43737 *Athyrium? Filix-femina* (L.) Roth
local colony on
- same - " flat ground
in ~~deciduous~~ deciduous
second - growth forest
183 38 *Carex*
very local
- 184 39 *Vaccinium atrosericeum*?
common
- same - in open *Pinus virginiana* woods.
- 185 40 *Pinus taeda*
occasional
- 186 41 *Myrica cerifera*
rare
- same - in mixed deciduous
forest with a little pine,
187 42 *Biospyros virginiana*.
rare
- 188 43 *Quercus palustris*
occasional
- 189 43a ~~Quercus alba~~
- 190 43a *Corus florida* L.
in understory
- 191 43b *Quercus alba* L.

small tufts, very loose,
lower sheaths carmine,
culms spreading.
shrub 1.5 m. tall,
fruit immature, not
glaucous.

tree 25 m. tall, 25 cm. dbh.

shrub ~~2~~ 2 m. tall;
sterile.

small tree 6-7 m. tall,
flowers cream-white.
tree 10 m. tall.

tree

tall shrub

tree

June 2 - Laurel Preserve,
Scientist's Cliffs
Deciduous forest on
sloping ground in dissected
area (1) - canopy nearly
complete, perhaps 80%,
spacing 3-4' m. Trees 30-75
nearly 120 cm dbh.

Canopy layer:

Frhodendron
Quercus prinus
Quercus rubra
Carya sp.
Quercus alba (me 9' circ.)

Second story

Cornus florida
Acer rubrum
Carpinus
Ilex opaca

Dwarf shrub layer (saplings)

Quercus alba
Acer rubrum
Aralia spinosa
Carya sp.
Carpinus
Quercus sp. (black oak or over, knap)

Dwarf shrub layer

o *Quercus alba*
v.c. *Acer rubrum*
Aralia spinosa
c *Carya sp.* → seedling
o *Carpinus*
Quercus sp.
c *Garrya sp.*
o *Vitis sp.*
o *Cornus florida*
c *Vaccinium corymbosum* (7 ft)
dc *Juniperus virginiana*
very few herbs
Desmodium sp.
o *Solidago caesia*
v *Goodyera pubescens*
o *Galium circaezans*
o *Limnanthes*
o *Ilex opaca*
Parthenocissus
Gaultheria
o *Rhus toxicodendron*
o *Quercus prinus*
o *Gelasturus mandshuricus*
o *Panicum 2 spp.*
c top *Carex sp.*
o *Euphorbia corollata*
o *Comandra umbellata*
o *Chamaephyllum maculata*
v *Cypripedium acaule*

Herbaceous growth extremely
sparse and scattered among dwarf
shrub layer. Perhaps 50-60%

bare ground or dwarf shrub
and layer.

Second story of Cornus and
Ilex & large sapling of
other trees, Amelanchier
especially, does not cover
more than 30-40% of ground.

This is on a slope of
about 30° down to a
deep ravine. This is a
dissected ground ~~mostly~~^{cut by} such
ravines as this.

Largest trees mostly on
interfluves bet. ravines,

though on slopes such as these
there are trees 30-40 cm. diam.

Bare ground covered by a
continuous layer of dead leaves,
mostly oak, especially
Q. rubra, *Q. alba*, ~~some~~ *Q. velutina*.

Locally some low shrubs of
Kalmia, only on upper edge
of slope, or break bet. interfluve
and ravines, poorly developed here.
Locally some shrubs of *Tessaria*
6-7 m tall to 3 cm. dbh. Small
patch Epigaea just below
top of slope, and a patch of
unrepulsive spreading from
old garbage dump.
1 standing dead chestnut

measuring 12 ft. in
circumference.

Area just across boundary
road from Miss Glass' house
Mixed second growth,
approximately equal parts,
but ~~unequally~~ distributed, of
Firiodendron, *Liquidambar*,
and *Acer rubrum*, a few *Quercus*
falcata, *Q. prinoides*, *Q. alba*, at least *Prunus virginiana*.

Canopy varying from
complete to fairly open
Maximum size tuliptree,
50 cm. circumference.

Second story of
Cornus florida
Acer rubrum
Ilex opaca
Nyssa

Second story almost or
complete cover as canopy layer.

Shrub layer 0.5-3 m. fairly
well dev., uneven, composed of
small *Acer rubrum*, small
Asimina, *Nyssa*, *Vaccinium*
stamineum, *Vaccinium*
cf. atrovirens. Small *Quercus*,
album and *Prunus serotina*,
also *Laurus* sp., *Cornus florida*, *Quercus*,

pinus, 1 larch 2 m. tall
In canopy at least, large
Qu. alba, ~~one~~

in second story one small
Quercus marilandica some
smaller ones in shrub layer

- o *Antennaria plantaginifolia*
- n *Asplenium platyneuron*
- v.p. *Polygonatum biflorum*
- c *Quercus* sp., (seedlings)
- c *Prunus serotina*
- c *Cornus florida*
- c *Ilex opaca*
- la *Polygonatum acutipetiolatum*
(on sides of ravine)
Corylus sp. (lower shrub layer)
- o *Luzula* on side of ravine
- o *Carex* "
- c *Pyrola* sp. seedling
- o *Potentilla* cf. simplex
- l *Smilax rotundifolia* in bottom of ravine
- c *Quercus prinoides* seedling
- o *Lonicera japonica*
- la *Prunus serotina* seedling on side of ravine
- c *Parthenocissus quinquefolia*
- o *Vitis* cf. *vestita* seedling adspersa
- e *Carex* sp. "
- l *Mitchella repens*
- dc *Rhus toxicodendron*
- o *Amelanchier* cf. *alnifolia*

- o *Kalmia latifolia* in snow
- c *Lonicera japonica* common lower in snow
- n *Viburnum acerifolium* tall and w.
- l *Polygonatum peltatum* where no other is found
- e *Arisaema* at snowline
- a *Desmodium* "
- o *Aster macrophyllum*? "
- n *Eryngium americanum* "
- d *Athyrium filix-femina* "
- l *Ulmus* " 1.5 m. "
- a *Diospyros virginiana* (1.5 m)

Area on opposite side of
ravine from Miss Glass' house
is dominated by *Pinus*
virginiana spaced from 1-4
m. apart, medium sized,
7-25 cm dbh and about 20-25 m
high; canopy thin crowns
narrow foliage rather sparse.
Many smaller pines & some
larger ones have been blown
down by wind sometimes
asp. as they are fairly well
rotted. A few scattered
small *Liriodendron*
reaching into canopy;
otherwise canopy is pine.
A single *Quercus* cf. *marilandica*
reaches canopy. Second
story scarcely developed -
a few *Quercus* cf. *marilandica*

about 4 m. tall; shrub layer to 4 m quite sparse, uneven, *Kalmia latifolia* common but by no means forms a continuous layer - some *Quercus* cf. *mainlandica*, *Q. alba*, *Vaccinium atrococcum*, *Acer rubrum* to 2.5 m, *Fagus*, *sylvatica* baccata very local, *Myrica* cf. *ciliifera* one plant seen 7 m, a few small *Hexodium*, one or two *Fraxinus* prinus to 5 m. a few *Cornus florida*. Ground at least 80% bare, but *Cypripedium acaule* locally very common *Clivinaphila maculata* locally common, *Mitchella* very local, *Vaccinium vaillantii* locally common, a very few tiny seedling pines - nothing above seedling stage. *Carpinus* sp. up to 1.5 m. not at all common, seedlings of *Brunnus serrata* local, very small *Lonicera japonica* flowering, locally common; a few seedlings or saplings of *Quercus alba* & *Fagus*, several saplings of *Carpinus* ~~up to~~ up to 4 m tall on 3 cm dbh. locally a few larger

Cornus florida up to 4-5 m. one liquid amber at least 6 m. tall; *Vaccinium stamineum*, occasional fair sized bushes; *Acer rubrum* locally common to 2-3 m. tall; one patch a few m. diam ad here quite a number of fairly large pines have been blown down. Here at least one plant of *Myrsin sylvatica*, a number of *Carya* saplings to 2 m; *Carpinus*, *Quercus mainlandica*, *Q. alba*, *Cornus* also here, *Parthenocissus*; ~~a~~ ~~assum~~ ~~ber~~ of *Camptis radicans* locally common; *Rhus toxicodendron* occasional. *Abies sparsa* common *Acer rubrum* locally abundant, *Rubus*, possibly *R. flagellaria* ~~occasional~~, young plants, rare; one small *Quercus stellata*; off sapling of *Lindera benzoin*. The west end of area has shrub layer fairly well developed, ~~part~~ at least 60% cover (part since down of patch of fallen pines). ground

layer (dwarf shrubs) is less well developed except from a thin scattering of *Lonicera japonica* and small seedlings of *Bassia* scattered under-story of *Cornus florida* and a few *Liquidambar*; a few seedlings of *Amelanchier* and seedling of *Prunus serotina* common; *Quercus alba* and *Carya* ~~seedlings~~ seedlings common. westward under-story of *Cornus* much more well developed, *Kalmia* much more rare and scattered but still present. Here and there an occasional small *Asimina triloba*, a small patch of *Epigaea repens*. toward the west end of this area a few *Pinus virginiana* measured 33, 36, 40, 43" in circ. most of them 6-7" dbh or less.

About the western third of this patch should be cut off as a different unit because of well developed shrub layer and open but noticeable second story. Here also

locally *Lonicera japonica* common, a small-leaved *Vitis* probably only young plants, *Campsis radicans*, small *Asimina*, plus *Toxicodendron*, and *Nyssa sylvatica* seedling occasional, one or two suppressed *Juniperus virginiana*; quite a few fallen pines, one *Nyssa* 6-7 m. tall.

On of Mann's areas marked 6 (indicated by my no. 5) the general forest is completely deciduous or with only a very occasional pine (*P. virginiana*) - flat with deep ravines cut in it. Forest of oaks of several species, more *Q. prinoides* than anything else but also *Q. rubra*, *Citiodendron*, *Acer rubrum*; one dead chestnut measured 12' 4" circum.

Forest on flat land has trees varying size 10-50 cm. dbh up to at least 30 m. tall. A fairly well developed under-story of *Quercus prinoides*, *Acer rubrum*, *Carya* sp., *Mitchella opaca* - covering at least 50% of ground.

Canopy uneven, covering perhaps 75% of ground.

In ravine gravels measured a white oak
10' 9" circum.

Upon flat ground shrub layer
(-3 m. tall) irregular, locally
very dense, ~~so~~ almost all
Kalmia, a few *Acer rubrum*,
Asimina, a few small
oaks, occasional *Carpinus*.
Almost nothing growing
on ground except a few seedling oaks,
Q. prinus, and a few seedlings *Acer rubrum*,
acc. vitis, *Mysa* seedlings,
one *Taqua* sapling almost
70 cm. tall, one small
Parthenocissus, *acc. Vaccinium*
stamineum, one or two stink
Desmodium cf. *nudiflorum*.
Seedlings of *Acer rubrum*
abundant at top of slope,
one little *Goodyera pubescens*.
In small side ravine,
slopes 30% side in forest
mixed *Q. velutina*, *Q.*
prinus, several tall *Carya*,
one or two *Liriodendron* to
30 m. tall; second story not
well developed. *Cornus*
florida, *Liriodendron*, *Alex*
on slopes. Shrub layer 2-3
m. tall, mostly *Kalmia*,
some *Alex* & *Acer rubrum* and

Nyssa. *Vaccinium stamineum*
occasional. ~~so~~ Almost no
ground layer except a few
tiny *Vaccinium vacillans*, seedlings
of *Acer rubrum*, *Plus toxicodendron*,
Desmodium nudiflorum,
one *Passiflora* seedling.

Bottom of ravine bare,
probably was an old
road at one time, nothing
in it except sprouts
of *Nyssa*, *Acer rubrum*,
the lobes of *Q. velutina*. One very
large white ~~old~~ oak in
upper end of this ravine.
Many old dead chestnut
snags and trunks.
Ground flora remarkably
scanty. One medium
size *buck*, one *Q. stellata*,
several *Q. falcata* and
Q. alba on lower slopes
of ravine. Where old road
swings up side of
ravine bottom clothed
with tall scrub up to 3 m
tall of *Kalmia*. At edges of
road *Gaultheria* locally
common. Several small
Fagus, *Cornus florida* growing
in tall shrub layer. Practically
nothing on ground under *Kalmia*,
which is tall enough & well under
with modifcally form *Kalmia* 10 cm
dbh, very twisted & crooked,

June 14 - Avon, near Fontainebleau
~~in grass~~ cultivated

43744 *Mimethia*?

1. 45 *Nephrolepis*

in greenhouse (plant
 from tuber brought from
 Jos, Nigeria, in 1959)

June 15 - Flight Only-Rome
 Boeing jet, rt side, takeoff 8:58
 cloudy so that nothing
 could be seen until 9:20 when
 break in cloud layer showed
 principally a pattern of
 green cultivation and small
 areas of forest. Cloud layer
 changed gradually to abundant
 but scattered small cumuli
 9:23 - patches and cultivation
 with some hedges. 9:26 clouds
 closed again. 9:31 several
 snow-capped peaks show
 through clouds, and green
 slopes below them - dark drab green
 low peaks show through clouds
 in distance. 9:34 Parallel
 valleys, green and cultivated
 across course. Then clouds.
 9:43 Green somewhat
 dissected pasture
 and cultivated country
 a large muddy river

slender woody twiner,
 flowers dull rose purple.
~~—~~ ponds ascending -
 spreading from short erect
 rhizome; stolons creeping
 abundantly over ground
 and closely appressed to ground.

running eastward across
 course. a compact red-roofed
 town or its banks 746 feet
 mts 9:47 Riviera coast
 near 140 mi. s. 71 Genoa.
 From then on over sea, which
 is a beautiful bright blue -
 not dark as in tropics.

10:00 Elba - Valley slopes
 wooded, ridge generally
 bare, high summit gray
 and bare. S.E. side around
 habo, has most of settlements
 and some rather poor-looking
 cultivation.

10:03 Another small high
 island in middle distance
 to right. slopes about 30°,
 mostly bare, almost no
 coastal flats or gentle slopes.
 no appearance of habitation.
 slopes mostly rock. little
 vegetation visible at this
 distance.

10:18 crossed an island or peninsula with dry brown low hills, a few patches of dark forest, much congested development along coast.
10:19 shallow water.

10:20 circling around Rome - clouds fairly dense.

Around the airport, at least north of it, is intensively cultivated land, with a strip of wooded or semi-wooded land, mostly small dunes, just back of beach. The densely wooded part has a ~~to sea~~ continuous scrub layer quite green, with widely spaced trees. Some patches of umbrella-shaped stone pines. Some patches of Ceratonia. In waste land along air strip many yellow ^{white} composite of a number of kinds. Grass mostly dry, other herbs green.

Rome to Istanbul - S. side of Douglas DC8 - departed 17:43.

[It would be interesting to make an investigation of the American weeds found in the Mediterranean.]

Much residential building along the coast just back of the beach, in the front of the belt of trees. Very cloudy,

visibility zero.

At 1:11 a dry brown east coast (green?) with several muddy rivers running into the sea could be seen. Cloudiness reduced but position in plane, over wing, made visibility rather inadequate.

At 1:16 we are following an eastward trending coast that soon bends southward.

The country is brown, but with about 30% dark green which must be forest. Serious erosion scars are abundant. This seems to be a large peninsula - small very compact white towns are abundant - most of the dark green is cultivation rather than forest - cultivation is almost 95% of land visible - some may be pasture, not determinable.

Turned south over this peninsula (or island) then east again (1:25). Clouds

1:39 a very bare rocky - long ~~steep~~ area, then mountain with large snow fields in high valleys. Then a rather extensive area of eroded brown hills, wide dry river beds. Then clouds for

a destination. Then, 1:48 mountains with some snow, then almost immediately, the sea again.

1:54 A rather narrow brown island or peninsula extending to south. 1:55 another one, this very eroded. actually they seem to be projections in a rather scalloped coastline, trending southeastward (1:56) with a small irregular island off the coast culminating in a high, sharp mountain with a little snow in ravines. Then the coast returns abruptly northwestward and all we see is sea again, except the top of the mountain over the wing. (1:57).

2:00 An irregular island in due distance to southeast, fairly large.

2:05 Two brown islands, the nearer one apparently a somewhat dissected volcano. Apparently no forest.

2:07 Clouds, no visibility.

2:10 Large low island visible through clouds to south, brown.

2:13 Large island (or mainland) with considerable forest. Another in distance to south. (this must be the *Rhophaea* ^{or *Andranika*} with land on both sides visible. Cloud,

2:17 Two mountainous islands in distance - seems to be wooded, but may only be shadow. Another (Is this Sea of Marmara?) farther away.

2:25 Descending over a flat partly grassy, partly built up area, many small islands in sea to right. Then circling around toward airport which is on a peninsula. Grassy country extends north to low hills in distance. It is really rolling rather than flat and has some trees in depressions, also on low scarpes and around small fields.

Land at 2:30 hay is piled up in fields along side of airport. Many weeds plants in flower.

Istanbul - Anksara - same flight. departure 3:30. Visibility not good.

3:36 ahead and to right a large snow-covered range. Many smaller ranges near-

mostly quite wooded.

3:44 Course swings some to left. Plateau is rugged and fringed by mountains, some of them well forested.

The general landscape varies from green to tawny.

3:45 Some deep soil erosion evident. Forest is ~~open~~ general or steeper slopes. Flat areas and other high flat areas are bright green.

3:49 Far distance is much less mountainous than near down.

3:50 Very rugged eroded dry country surrounding a large complex reservoir. Little evidence of green anywhere here.

3:53 An extensive green plateau with serious white erosion scars gashed into it.

3:57 Mountains scattered in plateau, no trees, much erosion. Some cultivation on leveler parts of plateau. A few small villages.

4:00 Toward Ankara much less erosion. Landscape treeless except in city of Ankara and ravine bottoms running into it. Several small reservoirs. Ravine

and narrow valley bottom have trees - *Balix?* *Populus?* Area toward airport level and very green. Many herbs in flower. Outskirts of airport quite colorful.

Many of them are legumes ~~etc~~ and ^{composita} *Ankara-Tehran* - same flight, right side. departed 5 pm.

Valley around Ankara airport is thoroughly cultivated. Tops of erosion remnants around it also slopes of these grassy, patches yellow or orange from flowers. Soil quite varied in color, buff to red or purplish red. Chocolate in valley. Eastward much gray rock is exposed on the hills.

Landscape continues to be treeless except in bottoms of deepest valleys. 50% serious gully erosion. Crossed a wide muddy river.

Mountains are rather gentle in their contours, ridges rounded. Much cultivation in broad valley, but people concentrated in rather large villages.

Country more dissected eastward. Much gully erosion locally. Long parallel valleys, sides cut into parallel gullies. sides of these gullied in place

5:12 Some kind of very large-scale agricultural project occupies the greater part of a wide flat basin - cultivation is long regular, strip-like fields. Irregular patchwork cultivation around it. Landscape in general is green except where badly eroded or recently plowed.

5:15 A snow-capped range in distance south & east. Gully erosion becoming much more serious. Some very flat areas being eaten into peripherally by gullies. Country continues treeless. One white range must be Encinas.

5:19 Several smaller but high ranges with a little snow to southeast.

5:20 Also just right of course.

5:21 Country becoming rougher, more eroded.

5:23 Snow in ravine on course, or perhaps white gravel?

Eastward country gets more eroded and rougher.

Various snow-tipped ranges in distance. Treeless country.

5:34 Immense system of wide river beds. Visibility

so poor that it is difficult to tell what parts are dry and what parts have water. Country becoming very mountainous and rugged.

5:35 Visibility becoming obscured by a gray, dust-like haze. This extends very high up. The white stripes on many of these mountains can be nothing but snow banks.

5:49 Combination of setting sun and haze make visibility very poor. Brown, treeless country with broad watercourses. Less mountainous here.

6:58 A broad braided river bed crosses course from south. Some water in it.

5:57 Another, but this forms an angle E-W. to course.

5:58 Extensive snow-field just to right of course - plateau like peaks.

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1963 Turkey - India

- June 15 - Ankara airport, Ankara, Turkey
 43746 *Melilotus*
 abundant on waste areas
 near runways.

June 17 - New Delhi, near
 India International Center

- 47 *Prosopis*
 common tree in waste spots

- ~~Scrophulariaceae~~,
 June 22 - 11 miles above Gaubati;
 toward Shillong, Assam
 48 *Emilia sonchifolia* (L.) DC.
 rare on vertical earth
 cut above road, among other weeds.

June 23 - Shillong
 in weedy spots in gardens
 of the Pinewood Hotel.

- 2 49 *Galinsoga*
 common
 4 50 *Drymaria* ~~biuncata~~ *villosa* C. & S.
 locally abundant

99

branched from base,
 stems almost erect;
 flowers bright yellow.

spreading tree 9 m. tall,
 leaves closed when collected
 at 6:30 p.m. Flowers yellow.
 fruit ~~so~~ thick, oblong
 in cross section.

flowers purple.

5000'
 1525m.

rays white, disk yellow,
 erect; petals white.

June 16th New Delhi

Plants seen

*Prosopis**Azadirachta indica*

s

Kigelia pinnata

* s

Ficus communis

c

Lawsonia inermis

s

Ficus religiosa

c

Annona donax

?

Livistona chinensis

c

Grevillea robusta

c

Ficus berghiana

* c

Lagerstroemia indica

c

Thevetia peruviana

c

Hamelia patens

c

Nerium oleander

c

Euphorbia spathulata

c

Eugenia cumini

* c

Atrophia

c

Cassia fistula

c

Zelkova pendula

c

Plumeria obtusa

c

Cesalpinia pulcherrima

c

Kochia scoparia

c

~~*Zelkova pendula*~~*Cynodon dactylon*

s

Jacaranda mimosifolia

c

Pithecellobium unguis-cati

?

Ceratonia siliqua

c

Dolomiaea rotin

c

Tabaconaserrata

?

Dianthus caryophyllus

c

Asparagus sprengeri

c

Portulaca grandiflora

c

Azadirachta is very common.
Kigelia, & *Ficus religiosa*
also common. *Eugenia cumini*
also.

Ficus religiosa called "peepul".
The *Plumeria obtusa* is a
form with ^{somewhat} small
leaves, emarginate at apex,
and corolla lobes much
narrower than usual,
pleasantly fragrant white
with yellow center.

The *Jatropha* has cymes
of flowers on long peduncles,
flowers 1-1.5 cm. across, crimson.
Leaves oblongolate to oblong-
obovate.

Lantana camara is a white
form with yellow eye, no prickles.

* common street trees

<i>Borago officinalis glabra</i>	c
<i>Tecoma stans</i>	c
<i>Duranta repens</i>	c
<i>Messerschmidia paniculata?</i>	c
<i>Lantana camara</i>	c
<i>Schinus terebinthifolius</i>	c
<i>Jridax procumbens</i>	s
<i>Eriogonum bonariense</i>	s
<i>Prunus persica</i>	c
<i>Antigonon leptophyllum</i>	c
<i>Crocosmia radicans</i>	c
<i>Crinum amabile</i>	c
<i>Yerbera canescens</i>	c
<i>Lycas revoluta</i>	c
<i>Alternanthera sessilis</i>	c
<i>Hymenocallis littoralis</i>	c
<i>Asparagus plumosus</i>	c
<i>Zinnia elegans</i>	c
<i>Amaranthus viridis</i>	s
<i>Quisqualis indica</i>	c
<i>Gomphrena fistulosa</i>	ca
<i>Rhoes spathacea</i>	c
<i>Helianthus annus</i>	c
<i>Dodonea viscosa</i>	
<i>Pongamia pinnata</i>	
<i>Impatiens balsamina</i>	
<i>Catharanthus roseus</i>	
<i>Chenopodium acutifolium</i>	
<i>Zornphrena globosa</i>	
<i>Gaillardia punctata</i>	

June 19 - bus trip Delhi to Dehra Dun

just outside Delhi, to north bet. highway and railway is a broad waste area, apparently a part of the river bed, with scattered bushes and mats of herbaceous plants. soil seeps of water - laundry spread out to dry, turtles removing earth, etc.

River bottom-land largely occupied by water-melon fields. Used year after year. Flooded.

Vultures common outside city, crows also.

Prosopis seems to be the commonest wild tree in the area near the river.

Young trees on these flats protected either by iron cages or by open circular walls built of brick.

Calotropis procera is very general along roads and in waste places. What appears to be *Paspalum distichum* generally abundant. Marshy place, some of them saline, and ponds frequent. Highway runs between railway embankment and river

on low flat land. Large irrigation canal. Indian buffalo common. *Ipomoea fistulosa* common locally. Some patches of what appears to be young sugar cane, though rather too dark green. Roadside ditches with filthy water. Land all checked for irrigation. Considerable maize. Sugar becomes rapidly more abundant. Mango common. Marshes and ponds much less common. Then more so in apparently alluvium area mostly not cult.

Second large irrigation canal.

Generally open country, very flat, some trees, esp. mango, miscellaneous cultivation, considerable sugar cane. Soil removed locally for brick clay.

Road lined all the way from Delhi by neem and *Pongamia* (?) trees, numbered.

Modi Nagar

Canal with little water, much *Eichornia*.

Date trees scattered locally (prob. introduced during Magus times).

Considerable sugar cane and maize, a little cotton. Carica. Dehiri shaped piles of cow manure. (for burning). Areas of alkaline marsh - Atriplex? *Paspalum distichum*?

Fences of a small agave.

Ipomoea fistulosa continues abundant locally along road.

32 mi. n. Pithi

Much standing water generally, esp. near highway crossed railway.

Parts of land apparently too alkaline for cultivation, covered by a very thin, very short grass.

Mount - some small citrus orchards.

Absent carica.

Some mango orchards.

Northward the country tends to be more open, larger fields. Larger checkis with higher levels.

4½ mi. northward road lined by thickets of small Phoenix, betw. them.

Agave hedges frequent, too.

Trees mostly *Pongamia* (?) numbered on wood in small window cut in bark. Number run between milestone separate series on opposite sides of road. Usually somewhat over 100 per mile on each side.

Cultivation mostly cane, some Vigna, mango orchards, maize.

Kabotitanda 53 mi.

Scattered trees and small patches of trees in field landscape.

Khatauli

Some bananas, carica, many mangoes. Ornnamentals. Large irrigation canal.

Trees in this area have been numbered but the numbers no longer show.

Most of cultivation is cane.

A few hedges of an *Opuntia* resembling *O. dillenii* in places mixed with Agave.

Peach orchards, + peach mixed with mangos.

~8 mi. Ground becomes slightly rolling. No cane on rolling

land. Reappears where it is flat again.
10 mi. + many orchards.

Mussafarnagar

A spiny Pittosporum,
Hibiscus hybrid, guava
orchard, beside the ordinary
things in this town.

Much brick made
in this area resulting in
large areas of excavation
about 1.5 - 2 m. deep.

Sugar cane + cowpeas
cult. north of here. A few
teak among trees lining
road. Numbers here painted
on ~~the~~ metal plates nailed
to trees.

69 - 7 mi. S. of Dehra Dun
Some cotton. much fallow
land, some cane.

Ditches and sewage ponds
 choked with Eichornia
some rolling land.

These rolling places
may be small areas of
loess or oaked dune sand.

Land well checked,
some of it flooded.

63 - D.D.

much flooded cane
land.

Very locally abundant,
mostly mango & Eugenia
cupressi.

D.D. 59 mi.

Burgazi - mostly
mud houses with thatch
roofs.

Mango orchards.

D.D. 57 mi.

Sugar cane, but low
hill, or rolling ground
in distance to st. nearly
bare and brown. - no, perhaps
it is a ditch bank.

Many trees in landscape
beyond ditch.

Much Euphorbia spathulata
in hedges.

Crossed ditches, which is
a huge canal.

Mango trees very
abundant around town
on other side.

Large mango orchards,
beyond.

105 mi from Delhi, 47 D.D.
Beyond this - cane land
and orchard, mostly
mango.

Root Roopkee - fence place.
Many large mango trees.
Lantana camara hedge.
Pomoea caerulea on fence.
Pithecellobium dulce common

Cane land largely fallow
 110 mi. Slightly rolling land. Mud village.
 Then mango orchards.
~~Tessaria~~ *Jatropha gossypifolia*
 hedge.

114 mi. Cane land, much of it fallow, some in corn fields, alternating with some mango orchards, local rolling areas.

Commonest tree, Delhi & here is Dalbagin of sissoo?

117 Gently rolling land cut by ravine, partly cultivated
 Mango orchard more extensive.

118 Some sugar cane again.
 A large tufted grass, resembling *Saccharum spontaneum* common on roadsides and levees.

Some *Pennisetum* sheep.

124 Crossed small river mixed cultivation, still some cane. A number of new roadside weedy shrubs have appeared.

126 Generally more rolling land. Shallow ravines.

Hedges of Funtana; etc.

128 Soil has become rather gravelly.

Some mountains visible ahead through dusty haze.
 sugar cane has disappeared.

129 Dry open forest area. apparently planted, as trees are in rows. Some clumps of a ragged bamboo interspersed. A thin shrub layer at least near road.

Soil very gravelly.

131 Forest denser, trees no longer in rows, semi-deciduous.

132 By road dry wash parallel with road not far from it. Very gravelly, bare.

133 Follow valley of the dry stream into a very rugged range of hills covered by semi-open, semi-deciduous forest.

134 Bare cliffs along stream.

135 If very little water in stream.

136 Forest becomes green and broader leaves, at

forest in canyon bottom.
On higher slopes still
pretty thin.

139 Stream has become
very small and the
canyon not very deep.
Up here the forest is certainly
deciduous, now in young
leaf stage.

139.5 At top road goes through
a tunnel. Then winds
down a similar canyon.
Forest somewhat greener.
Within less than a mile
this widens out into
a flat wooded valley.
Woods seem to be an almost
closed low broad sclerophyll.
Trees are small - forest
looks rather coppice-like.

142 Some cultivation and
some forest plantation.

Then cultivation and
pasture, open trees and
hedges. Flat wide valley
bottom.

Suhar Nagar.

Forests. Hedges along
streams.

Cannabis common weed.

June 20 ~ Dehradoon

Weeds

Ageratum conyzoides
Afinium leptophyllum
Kedem pilosum
Cyperus rotundus
Imperata sp.
Lantana camara
Cannabis sativa
Eriogonum bonariensis
Ricinus communis
Argemone mexicana

Monstera deliciosa
Psidium guajava
Cassia fistula
Litchi chinensis
Cedrela toona
Mangifera
Dalbergia sissoo
Adenanthera pavonina
Ficus benghalensis
Pithecellobium

June 21 - bus trip, Dehra Dun

to Delhi

young forest at base
of range just s. of D.P.
large terraces, nests very
conspicuous. Toward mts.
forest is older and larger
more closed. Forest on
slopes is smaller again,
commercial species being
removed while still small.

South slopes - forest
very thin, erosion severe,
mountain low but very
sharp and jagged. River
bed broad, gravelly, bare.
In places a conspicuous, short,
tufted grass - *Andropogon* sp. ??
Large proportion of trees in
forest, esp. on slopes, are in
young leaf. Forest on forest
slopes in thick, twisted.
is slender, thin *Opuntia*
(or *Nopalina*) is fairly common.
The termitariae are lacking
on this side.

Except for the forested
Siwalik Range, the
road from D.P. to Delhi
runs through flat
cultivated land, almost
entirely checked with
levees for irrigation by
flooding. Along the road
is an almost continuous
series of ponds, pools and
mud holes that are used
by the buffalos for bathing.
Some of these are filled
by *Eichornia*, more not.
The low mud walls or
levees that line the
road are colonized to
form hedges by several
plants - *Moronea fistulosa*,
Opuntia cf. *dillenii*, *Agave*
lascallana (?), *A. candelabrum*,
Euphorbia spathulata,
and many others, differing locally.
These possibly spontaneous
at least in some places
probably planted.

Trees, mostly *Palbergia*
sissoo, *Mangifera*, *Eugenia*
cuminii, etc. are planted at
5-20 m. intervals on both
sides of the road. All are
numbered. The soil is a
brownish gray cloddy silt.
The crops are mostly

sugar cane, rotated with maize, cowpeas, and a few other things. Many fields ~~are~~ are fallow just now, and all cane is very young. Apparently it is harvested in Jan.-Feb.

The landscape is generally open with scattered trees, clumped around dwellings, orchards common near upper end of road.

Here and there are low hills or mounds of loam or similar material. Around houses and villages are conspicuous bee-hive shaped manure piles often thatched with straw, 3-4 m. high. Houses are made of mud or brick.

Along the road the grass, mostly cynodon, is eaten very close. Calotropis is a generally common and conspicuous weed.

Buffalos and humped cattle are very numerous. Birds, esp. crows, mynas, etc., very common. Also small egrets, Herons, storks, stilts(?), vultures occasional.

Younger trees are on circular platforms surrounded by deep circular ditches and high circular levees.

The sky is gray with dust, said to be from the Rajasthan Desert, and a hot west wind is blowing.

Locchavera spontaneum is common locally on levees and roadsides, the clumps in places rather close.

Phoenix sp. also common locally along road. Large trees feed, loc (1-2 m) locally abundant.

June 22 - New Delhi to Calcutta - flight in Viscount at. side (over wing) def. 6:45. Dusty haze at Delhi.

Visibility not at all good.
7:24 still dusty.

7:34 crossed large river, trending about $30-45^{\circ}$ w. of course, with a broad apparently gravelly bank bed, considerable water, running through a wide strip of country that appears, though visibility is poor, to be uncultivated. Bordering this is cultivated land.

7:42 cultivation not evident, apparently pasture, and small irregular scrub or forest patches, hedges are dominant. Dust still notable.

7:58-8:00 apparently a savanna landscape with trees very irregularly distributed. Trees becoming more abundant, increasing evidence of cultivation (8:03).

8:05 a small river with water in it, trending slightly w. of course, but no apparent influence on the dry ~~rocks~~ appearance of the landscape.

From here on for some distance cultivation increases and trees decrease, but the

general aspect is still dry and brown. Visibility still not very good.

8:20 crossed a very large river at right angles to course, but well to right turning almost parallel to course. Broad gravelly (?) bed, quite a lot of water, some old meander pattern.

8:28 More trees evident, strongly clumped with dry brown areas between, then (8:34) tree, almost lasting.

Visibility becoming poorer.

8:38 crossed a very large braided river at rt. angles to course. General tone of country has changed to a dark color instead of tawny brown - visibility too poor to determine for certain if this is due to increase in wood & vegetation but probably so.

8:45 generally tawny again, few trees.

8:53 another large river at about $60^{\circ}-70^{\circ}$ w. of course.

8:46 another, smaller, w.

Country generally somewhat darker in tone. Visibility still poor.

8:55 more vegetation but visibility poor.

9:08 A mountain visible through haze to right in distance.

9:07 no visibility
am. 9:40

June 22 - air trip, Calcutta - Gaubati
in Pahar Friendship at side.

Dep. 11:38

Morally diffuse villages
and cultivated land.
Trees abundant around
village areas and locally
around cultivated patches.
Thus cultivated patches
mostly surrounded by
levees - some patches are
flooded individually,
but large areas are
flooded without regard
to field boundaries.

In some areas there are
small patches of trees
in others hedgerows around
fields.

Circled until 11:37. By this
time thin cloudiness is
obscuring visibility. Consider-
able areas are under water,
but there are not generally
where there are houses.

Landscape generally green.

The submerged areas are
generally treeless.

11:41 Flooding is in longitudinal
strips, apparently meanders.

11:43 same pattern but
visibility fading to nothing.

11:44 greater portion of ground
flooded, relation to vegetation and

houses not clearly visible.

11:46 flooding patchy.

11:49 Perhaps 75% of land submerged.
Intricate system of old
meanders & oxbows.

11:55 Cultivated land, not
flooded, long old meanders
with dark not muddy water.

11:56 Much flooding again.

11:59 Flooding general, even in
~~roads~~ between houses.
Then relatively dry land
with only patches flooded.
Visibility almost none.

12:08 Crossed an enormous muddy
river. A few small sandbars
are dry. A larger island in it
looks as though it had been
seriously washed over. Now dry,
as is the land on either side
of the river. Clouds again.

12:13 Another very large river
with much flooded ground,
intersection of a large tributary
coming from direction of our course.

12:14 Meanders and cutting off
of meanders. Clouds again.

12:17 slight thinning of clouds -
a meandering red muddy river
apparently in flood.

12:46 Bumpiness; clouds to great ht.
Hill below, but not visible.

12:53 Low hilly country, partly
grassy, very green. Cloudy.

- 12:51 Large expanse of solid undisturbed forest, billy, white-water streams.
- 12:53 A few clearings. Clouds.
- 12:54 Solid forest again. Fair sized rice crops. Crops
- 12:55 Clearings in forest. Then forest apparently burnt. Then villages and cleared areas.
- 12:56 Cleared land along rivers, considerable population, forested hills between rivers.
- Cultivation appears to be rice. But certainly 95% of area of visible land is still forest.
- 12:57 Large area of rice land start descent to Gambati. Vast area of rice land, forming a generally square pattern of subdivision. Small villages in some parts of rice area, surrounded by bamboo.
- Other areas with no villages. These are flooded. Really much water, generally. 12:58 Flooded.

June 22 - Gambati.

Plants seen

Aichhornia crassipes
covers ponds, floating in rice
Carica papaya
Melia azederach
Helianthus annuus
Thevetia peruviana
and a cream fl. form.
Adenanthera pavonina
Crocosmia Lucifer
Mangifera indica
Ficus religiosa
Samaranthes samban
Plumeria rubra
Artocarpus heterophyllus
Fructus galilis indica
Codiaeum variegatum
Jasminum grandiflorum
Dahlia variabilis
Cyperus rotundus
Petunia
Salvia splendens
Sanzaviera zeylanica
Cissus quadrangularis
Psidium guajava
Citrus hystrix
Acalypha hispida
Euphorbia bojeri (milk?)
Mirabilis jalapa
Dianthus caryophyllus
Hymenocallis littoralis
Jasminum sambac
Portulaca grandiflora
Impatiens balsamina

Colocasia esculenta
Pantana camara
Manihot esculenta
Zea mays
Cassia fistula
Crotalaria mucronata
Cariota
Areca catechu
Ficus infectoria
Tectona grandis
Lesbania grandiflora
Oryza sativa
Musa sapientum
Delonix regia
Jatropha curcas
Eclipta alba

Rice land is mostly fallow at this season. Seed beds well up.

* Trip by car Gauhati - Shillong
Lower hills - topography looks like Khasi, red soil.
Forest nearly destroyed - open ^{tangled} second growth, tangled with bamboo. Musa common, spontaneous.

Plant seen at gate, 11 mi. from Gauhati:
Crinum sandwicense
Thunbergia alata
Solanum nigrum
Cleusine indica
Portulaca oleracea
Amaranthus viridis
Hedysarum nodiflora
Amaranthus spinosus
Monochoria vaginalis
Oxalis corniculata
Chrysopogon aciculatus
Momordica charantia

Bamboo, trees
said to

Hill slopes dominated by a clump forming bamboo with arching tips after about 25 miles the bamboo is still present but other trees are generally dominant, or at least abundant.

June 23 - Shillong, Assam.
Pinewood Hotel is surrounded by *Pinus*, *Cryptomeria* and a profusion of planted ornamentals.

Eupatorium adenophorum is very common and regarded as a pest.

E. odoratum is well represented in the herbarium, as is *E. rivularis*. *E. wallichii*? looks similar.

Lantana camara is also abundant, a form with rich crimson and yellow fls. *Sambucus*, possibly *S. mexicana* is occasional in yards.

Pine forests have almost no second story, but have a shrub layer very well developed, of *Lantana* and *Eupatorium*. *Gleichenia* cf. *linearis* common on road cuts below Shillong. Above f. the was not seen, but a large one of the *G. japonica* group is common.

On way to Gauhati the pines disappear essentially at about mile post 5 3/4 (from Gauhati) and definitely at m. p. 7 1/2. A small acaulicent *Phoenis* appears in scrubby fields just above here.

June 23 - The Peak, above Shillong.

This mountain is almost completely covered by *Pinus insularis* forest, except for a few patches of broadleaf evergreen - *Quercus*, etc.

These are covered with elephant. St. trunks at least, and ferns are abundant on the ground.

It seems likely that the broadleaf forest formed most of the original cover, but that pine has been favored by selective cutting and perhaps even more by burning, gradually leaving an almost pure pine forest. *Acacia mollis* is naturalized and forms thickets and small bits of forest.

The pine forests are semi open to closed have mostly very little undergrowth.

Photos Two or three photos (b&w + color) but not taken from a very good place.

At about 5 1/2 mi. above Gauhati on road a hydroelectric dam is being constructed. It will flood a fine valley with considerable rice land.

Jan 23 - Lawlyngdoh Forest
Sacred forest of Lyngdoh, clay
photos from distance and
close up, latter with alter
and monuments. 6000'

Has not been cut.

A granular montane rain
forest or mossy forest -
canopy very irregular, at
10-15+ m. high, trees with
trunks to 4 dm dbh, spaced
2-4-5 m. A second layer
^{Viburnum} of tall shrubs 4-5 m. These
slender, and almost
continuously varying in
height. Open tall herb
layer of ferns *Dryopteris*,
a very low layer of mosses
Oplismenus, a few ground
orchids - *Oxalis griffithii*, *Ophrys*
reef *Litsea*.

Guercus dealbata

Guercus blanifolia

Chionanthus implexiflorus

Bijes pashia

Schima khasiana

Schima wallichii

Magnolia insignis

Mosses and hepaticas
very abundant, but filmy
ferns rare. *Piperomia reflexa*.
Vaccinium serotinum
an epiphyte with a brittle

Photos

of the stem swollen
and fleshy
i large *Ficus*, to 15 m. is much
common.

Forest is about $\frac{1}{2} \times 2\frac{1}{2}$ mi. in
area. 1/2 mi. long $\frac{1}{2}$ to 1 mi. wide
on rolling, almost hilly ground.

~~Mauphlang~~

It is situated on a
rolling rather hilly
plateau that is
otherwise entirely
in bare short grass
pasture with scattered
clumps of *Melastoma*
malabathricum.

This forest is regarded
as sacred by the "Pagan Khais"
who will not take a
stick out of it. However the
"Christian Khais" run
their cattle and goats
in it, and although there
has been little cutting
of trees, the undergrowth
shows considerable
damage.

Kod. & b+w photos from a distance
and close-up outside, several
b+w. inside, but possibly
underexposed.

June 23 - Lawlingdoh Forest,
just southeast of Nawsiblang,
Khasi Hills about 15 mi.
s.e. of Shillong
in mossy broad-leaf
evergreen forest

6000'
1800 m.

- 43751 *Ophiurhiza*
very common
- 1 52 *Pratia begoniaefolia* Lindl.
very locally abundant
- 1 53 *Lysimachia*?
rare in rocky bed of ravine
in ~~soggy~~ full sun.
- 1 54 *Poly podium*
~~on~~ on tree trunks
- 1 55 *Poly podium* ~~Pyro~~ *Pyronia verna* (Lam.) Farwell vel off
on tree trunks
- 1 56 *Taxus "baccata"*
occasional
- 1 57 *Hymenophyllum*
on an occasional tree trunk

flowers white.

very prostrate; pedicels erect,
flowers purple and white marbled;
fruit turning purple.
leaves purplish green;
corolla yellow.

tree 10 m. tall, others larger;
sterile.
ponds hanging down.

June 24. Trip by car from Shillong to Gauhati - (see p. 126 for notes on upper 15 mi. of this road.)

Hilly land, the flat parts and gentler slopes (less than 30°) cultivated or ~~as~~ in grass (*Imperata cylindrica* frequent) steeper slopes in poor irregular scrub, ravines with thickets. Huts frequent. A few pines in ~~the~~ thickets in ravines bet. m.p. 49 & 48.

Mango seems to be the most important crop on slopes, rice in ravines & valley bottoms. Lorne Musa - Cane.

What appears to be *Rhus javanica* is common on sides of ravines.

A few more pine bet. m.p. 44 & ⁴⁹₄₁. A little rather ratty forest ~~on~~ on steep slopes around m.p. 45³⁹₄₁ - broadleaf evergreen. Being logged.

Below here *Bambusa tulda* seems to dominate the slopes.

Just above m.p. 38 is an ipesac plantation. The plants shaded by sloping board structures.

Nongpoh - m.p. 29

Vernonia cinerea

Cyperus esculentus

Solanum lyngbyoides

This area generally seems to be a series of hills of pegmatitic granite with a deep (2-4 mt) layer of dark red residual or deposited weathered material on it. This often includes boulders up to a huge size of the same granite. Below m.p. 27 the rock changes to a fine grained irregularly banded metamorphic rock.

Canyon bet. ~~26~~ m.p. 26 & 25 has steep walls with thick forest broadleaf with much *Bambusa*. Cleared in places for plantations of a Musa with ascending leaves, possibly ~~the~~ *abaca*. This is also common wild.

Much Teak planted below m.p. 24.

Below about m.p. 17 the hills tend to be more or less cleared, though still large areas are covered by a mixture of trees and bamboo. Then less clearing lower down.

In Assam, at least around Gauhati, the water buffalo replaces the Indian buffalo.

The Brahmaputra at Gauhati, is at least 6 km, perhaps 1 mile wide, contains quantities of floating vegetable debris, probably mostly Eichhornia; steamer and boats of many kinds, muddy water.

Hills bet. Gauhati and airport show dome-like exposures of granite.

Colocasia cf. esculenta is very abundant in muddy places in and around Gauhati. *Alocasia macrorhiza* ~~are~~ rarely seen.

Jatropha gossypifolia uncommon.

Eichhornia varies tremendously in stature - to nearly 1 m tall.

Crows are the common scavengers in Gauhati - abundant and aggressive.

On the outskirt, was a large flock, perhaps 100, vultures. The crows were harrying peripheral individuals.

June 24 - flight Gauhati - Calcutta. Friendship. 5:25

The Brahmaputra, below Gauhati is even wider, spreading over a vast area - not clear if this is normal or only because of flood water, but judging by the defined banks, it may well be normal.

Beyond the banks there are vast areas of flooded land and partially flooded land. Actually it must be more flooded than it seems, as there is somewhat of a patchwork pattern about it, with some squares completely water, others green - probably the grass is merely higher. Many meandering channels.

5:33 visibility zero.

5:38 Hilly country, largely cleared, but visibility bad.

6:00 vast marshes right, with a network of channels on both sides - no details visible.

6:16 Landscape 98% water.





June 27 - Flight Calcutta -
Singapore Boeing 707 rt side.

Total off 1:25.

Delta area with extensive green ^{inundated} rice land with no houses or trees, wandering through them irregular patches of trees with houses. The pattern of these is ~~not~~ not obvious, but most are irregularly elongated.

1:27 a fairly large area that is high enough not to be inundated - scattered houses and patches of trees.

1:28 Area near the broad winding course of the flooded river is lower and irregularly flooded.

1:30 Clouds.

1:31 A network of tidal channels on a gigantic scale draining into an enormous river, tending more or less the same way as the course.

Interfluves cultivated but tending to be less so.

1:34 Channels tend to have dark bands of trees along them and light green interfluves.

1:35 Interfluves become solid dark green - probably mangrove swamp - perhaps the Sunderbunds. Visibility getting worse.

1:33 Crossed the coastline wooded to the beach; just to left are two enormous estuaries.

3 Kod
photos.

June 11 - Singapore -
looking from Kranji War Cemetery
the general landscape is rural
in all directions, dominated
by Coconuts & other trees, but
actually rather open, much
grass (*Imperata*) and cultivation.
bits of rubber plantation.

Grass has taken over the
eroded areas much more ~~so~~
than in 1956.

Ixora chinensis
Portulaca grandiflora
Pentas coccinea
Hemigraphis colorata
Cocculus lanceolatus
Mussaenda donax Wong
Betoperone guttata

Jan 31 Johore Bahru

Back of this town are vast
areas of old rubber planta-
tion with an open growth of
seedling trees. Grass and
melastoma between trees.
also some areas of rolling
grassland. Patches of thicket
then some rather young
plantation, mixed with
areas of thicket - shrubs
about 4 m. tangled with
melastoma and Gleichenia.
Some plantation being replanted.
Plantations are clean-cultivated.

An Ischaemum or Tannum is
abundant where anything
has been allowed to grow.

Also *Paralium obiculatum*
Pteris sp
Clidemia hirta
Bromelia
Lycopodium cernuum

Under some of plantations
the next growth has been
sprayed and is gray-brown.
Gleichenia on sprayed road-
sides sprouting from rhizome.

About $\frac{1}{2} \times 17$ large areas
of ~~soil~~ scrub + thicket -
Bromell grass formerly
gambier land. Then small
area of secondary forest.

A few areas of rubber
poisoned for replanting -
bare skeletons. Being cut.
Herb growth dead from spraying.

Kotatinggi - some secondary
forest just outside town,
esp. on it. of road. Tide
water at least up to here.
Then more rubber in various
stages.

At about m n. 31 country gets
hilly and there is considerable
degraded forest on steeper ground,
also thicket or belukar.

Pteridium along road.

Considerable "guenars" in
flower.

Solanum parasiticum on
rubber - native in forest.

On road to
through low hills - many
patches of forest mixed
with rubber, some of it
rather good.

Some swamp in low places.
Toward coast ~~more~~ more
forest, less clearing, no
rubber. Clearings all
in bananas, maize, etc. mostly
along road.

? b/w
Photos

Kaula sedili (Jaron Bay)
wide sandy beach,
intertidal, sand flat
back of beach sloping
gradually back to low
swampy land.

The beach ridge occupied
by sparse Casuarina forest
only a few yards wide,
ground covered by a
mat of *Thunera*, and
Hypolepis virginicus,
Chrysophyllum aculeatum,
and, as lower levels are
reached, *Fimbristylis cymosa*,
shrub of *Desmodium*
umbellatum, *Glochidion*,
Dillenia, *Pandanus* etc.
with Casuarina.

Then a strip of low
grass with *Scamum*.
This grass has *Chrysopogon*,
Digitaria sp., *Fimbristylis*
and sparse *Imperata*.

As forest is approached
sparse shrubs of *Melastoma*,
Eugenia, *Glochidion*, *Ardina*,
Cerbera, *Desmodium*, etc.

The thickets at edge of
forest are of *Hibiscus til*,
Dillenia suffruticosa,
Eugenia sp., *Oncopanax*
filamentosa, *Glochidion*,
Cerbera,

actually the forest here is a bit degraded canopy very open, undergrowth thick.

Back across the stream forest stretches for a good distance.

A fair diversity of trees no well developed second story. But layer thick, diverse in species. A number of herbs - *Hedera*, *Zingiber*?,

Deep black-water channels meandering through. Quite a few vines, some prickly.

This forest is very much disturbed - paths everywhere, cut palms, etc.

~~July 1~~

July 1, Bukit Timah - looked for geophils, but certainly none on the steeper slopes.

Here there is considerable Calamus of a small short-stemmed type.

July 2 - flight Singapore Rushing (Viscount st. side) East of city considerable areas of coconut trees.

Islands s.w. of Singapore mostly built up but a considerable area of forest on south side.

The tiny islands with wave-cut cliffs, scrub vegetation, no buildings.

Then across a considerable channel several large islands completely covered by tank farms.

These islands are the ones in immediate vicinity of Singapore.

A few minutes later several rather large islands on right appearing somewhat dry, mostly wooded but scrubby, many clearings, especially close to coast.

Then several ~~south~~ farther in distance a large island, with a brook to north almost to course, generally a patchwork of forest and clearings in various stages of regrowth. (to p. 146)

144 1963 Malaya Johore

June 30 - between Katatinggi and
Kuala Sedili (Jasm Bay), south Johor

43758 *Blechnum stenochlaena* (L.) Presl
var. *pinnatifidum* (Burm.) Bedd.
occasional at edge of forest

June 30 Kuala Sedili (Jasm Bay) 1 m.
south Johor

on flat of ~~soil~~ white quartz
sand, just back of beach.

3 59 *Scleria*
common in secondary forest

✓ 60 *Fimbristylis cymosa* R.Br.
very common in open grassland and

✓ 61 *Petunia racemosa* (Roxb.) R. Schum.
occasional in small thickets

✓ 62 *Cyperus f. spiracelatus* Rottb.
common in ~~of~~ open grassland

3 63 *Uvaria*
in edge of forest

✓ 64 *Cyperus polyanthus*
common locally in grassland

✓ 65 *Ardisia elliptica* Thunb.
common in thickets and edges
of forest

3 66 *Gloriosa littoralis* Bl.
at edge of forest

✓ 67 *Melastoma malabathricum*.
common in grassland

3 68 *Desmodium umbellatum* (L.) DC.
common in thickets and
in edge of woods

145

rhizome scrambling
in shrubs.

tufted, dark green.

culms ascending to erect
shrub

culms solitary or two or three,
- ascending.

stiff, linear, perianth
brick red, stamens yellow.
culms ascending.

shrub 2 m. tall;
flowers dull pale pink;
fruit black when ripe.
shrub 3.5 m. tall.

shrub 1 m. tall; flowers
deep rose purple; fruit
black, irregularly circumscissile
when mature.

shrub 3 m. tall; flowers
white

Some areas of fairly good forest on north side, but mostly cleared in interior.

Some white sand showing through scrub along north coast. - The beach sand is yellow. Patches of good forest eastward but mostly cultivated.

The coast swings away from course, to south. Visibility becomes poor. End of island at 9:30.

Borneo. Large river with very little swamp.

A large sand flat to ~~the~~ left of mouth with uniform scrub vegetation. Country behind this partly wooded but large tract cultivated.

Cleared in strips - system of wads at right angle to road along the large river. Water a peculiar muddy black color.

On right bank ~~also~~ large area cultivated.

A meandering tributary has a large patch of forest on its left side.

Pattern of clearing is very odd - long narrow strips at right angles to roads.

Large areas of forest well away from roads, but taking country as a whole the greater part is cleared.

Back in country patches become irregular in shape and a typical shifting agriculture pattern appears. But these are larger and larger areas of not much disturbed forest. Clearing along streams.

Then a great area of forest along course that shows little disturbance. Shifting agriculture in the distance. Then close along small river.

Then very large area not at all disturbed, even along small stream.

Patches of swamp with finer, more uniform texture. This also along streams in a narrow strip. Much shifting agriculture in distance.

Forest becomes more irregular (heathy forest acc. Kosterman)

Then a road with sand

along shores. Much shifting agriculture along this river and extending out from it.

Then entirely shifting agriculture and some swamp. Country hilly, numerous red gullies or landslides.

Many parallel mountain ridge in distance parallel to course.

Along course nothing but shifting agriculture ~~else~~ on hilly land. Very little forest of any size except on hill-tops.

Spectacular karst with domes and cliffs just back of a small reservoir and some sort of industrial development.

Flying over patches of karst. A paved highway going out into the area where these karst "mogotes".

Many very large karst hills in distance. Several winding rivers. Paved highway along course. Forest on hills.

Various kinds of agriculture & pasture as we approach airport. Much degraded or secondary forest.

Landed at 11 a.m.

Kuching - plants seen

Artocarpus altilis

Pentas lanceolata & other farms.

Mussaenda Dorje Amara

Cocos nucifera

Hibiscus Blooms

Delonix regia

150

1963 Singapore

July 1 - Bukit Timah

in dense rain forest on ^{upper} slopes

43769 (sub.)

1 common

1 70 *Psychotria*?
rare1 71 1 *Pentaphagma* cf. *decurrens* Arey Show
rare

151

prostrate; flowers greenish white.

unbranched shrub 1 m.
tall, thyrses white,
~~petioles~~ slightly fleshy;
corollas white, tinged
with purple.
flowers white.

1963 Borneo - Sarawak
admiralty chart 1822.

July 5 - Trips by launch
Kuching to Bakut Nat. Park.
along Lunai Sarawak
on north bank dwelling
nipa. Few habitation on
s. bank, no nipa, until
past the factory. Then a
village of long houses
around curve, on north
side mangrove swamp,^{on convex side,}
apparently mostly *Avicennia*.
Belukar on the south bank,
on concave side. Ground on
this side perhaps 1 m.
above water (2 ft. m.). Tangled,
Pandanus thickets, nipa
locally scattered large
tree - ~~perhaps~~ *Dioscorea*, *Heritiera glabra*.

On next curve, nipa
is on both sides, mangroves
on convex side again.

On concave side slightly
higher ground, with
closed forest. Where
the river is straight
again both sides are at
least 1 m. elev. This is
Prima Donna Reach.

Can see Bulit Sejingga in
distance ahead, high point.

Both banks become lined
with nipa.^{no opp.} Part way, on left,
is a high spot, several m.,
partly cut away by river.

Bintawak
P.S.

Where channel bends slightly
to right, well developed
mangrove swamp, taller
trees *Avicennia*, lower
ones *Rhizophora*.

Out on Turnabout Reach, on
west bank is well developed
mangrove swamp -
Avicennia, some *Rhizophora*
in understory, shrub
layer of ~~Acanthus~~^{Broad-leaved}

Other side is almost
solid nipa, low level
perhaps 0.5 m.

Then this on both sides.
Then on convex left side,
mangrove, mostly *Avicennia*,
some nipa. *Acanthus*
cf. *elatistatus*.^{Brown leaves}

On other side around
Bianah (shell tank farm)
extensive nipa, rather
flat, extending to Pending Pt.
Probably has been cut.
Mangrove on opposite side,
much nipa in understory.
Avicennia trees rather
widely spaced.

Turned left into Batu
Blat Reach - much wider.
Some settlement in flat
ground 1 m. or so above h.t.
Similar low ground
mostly nipa, or ~~nipa~~

left bank. Then nipa on both banks, much avicennia on left bank scattered through the

Beyond sawmill wide areas of nipa on both sides with scattered avicennia.

Tanjong Balu.

Bejinghat ^{Bam} village on rt. Bejinghat & Burit Bejinghat on left. Lowlands are vast stretches of nipa with scattered trees.

Slopes of hill covered by a mixed forest, rather irregular, ~~but~~ perhaps secondary. Lowest slopes belukar, regrowth after clearing.

Bejinghat is a sea Dyah village, on piling, on beach. (photos bld, b-w.)

Beyond this large areas of nipa swamp on both sides of river. Larger trees well back from river.

Rounding Renard Point large hills come into view ahead, some very high ones in distance.

Low ground with nipa on both sides. A few large flat topped or umbrella shaped trees some distance from river.

To left some taller palms probably coconut. Back of nipa. Probably plantation on sand ridge in swamp.

Village of Kampong Senai on left. Hill above it covered with apparent second growth.

Across on right - Mangrove swamp. A green closed understory (*Rhizophora*?) and scattered tall avicennia.

Sungai Beradeli Bera on rt. Nipa on rt. of rt. mangroves with dense *Rhizophora* and sparse taller avicennia on left.

Scattered small hills with thick woods, on left of main river. One is near distance with much of forest leafless (dead?).

Rhizophora on rt. shows a sharp high tide line.

On left between hills, low stretches of avicennia swamp, possibly some Sonneratia. Front part low, back of this an abruptly higher closed stand.

On left, ahead, Gunung Ayer - a high forested hill with a village, Kampong Muara Pebas at base.

some buildings on lower slope of hill.

Opposite point is nipa swamp on river bank, forest of some sort on sea side. This is the mouth of Sungai Kuching.

Clump of Casuarinas on outer beach opposite forest back of it.

Tg. Muara Tebar is a headland, grassy on back slope, wooded on sea bluff, rocky shore.

Beyond Tanjung Po - sandstone headlands, largely covered with Casuarina cf. sumatrana. Lower wave-cut cliffs are almost completely bare.

In some places broad leaf trees predominate, locally palms (Areca sp.) ^(Photos b+d) ^{above wave-cut} ^{cliffs.}

West end of Pulau Laker has only low vegetation (photos b + c. nov.)

Along shore of Telok Lebur - Casuarina equisetifolia on shore. Wooded cliffs, then a gently sloping terrace with fine forest, sloping up to a wooded ridge behind.

Across to west are

very bright rugged mts. in distance.

Along shore w of Telok Lebur are low wave-cut cliffs with or without beach or erosion ramp in front of them. No evidence of habitation.

In some places at the tops of the wave-cut cliffs is a zone of low dwarf scrub or grass. (Extending on sandstone.)

Beaches at mouths of principal gorges that come down from upper terrace. This upper terrace seems to extend all along coast, locally interrupted by small eminences and gorges. It may be 30-50m. high.

At Balok Park Hq. There is a very wide, very gently sloping beach. At high tide mark is a thin sod of Cyperus sp. extending up, with in places an interrupted strip to the edge of the woody vegetation.

Along top of beach are scattered Casuarina trees and between them a thicket or scrub forest of Hibiscustiliacei. ^(10-15m) and Beaufortia taccada (about 4m)

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- July 6 - Sabah National Park
Lintang Path, ^{on plateau} back of Teloh Assam
~~Top~~ Dissected sandstone,
in thin scrubby forest on
43772 (Osh!) + ~~1~~ Euthemis
2 in undergrowth
73 *Lithocarpus jahui* Hayata

- 74 *Vatica* n.sp.
rare
75 *Pteridium aquilinum* (L.) Kuhn
occasional in open sandy place.
75a *Garcinia sarawakensis* Pierre
same - in "padang" a ~~top~~
open scrub area on sandstone
76 *Xyris* sp. *borneensis* Rendle
local
77 *Utricularia racemosa?* Wall.
rare on wet bank of stream
78 *Drosera spatulata*
common on wet bank of stream
79 *Schoenus calostachyus* (R.B.) Poir.
common in open places
80 *Isachne confusa* Ohwi
common in moist open places
81 *Cladium persicaster* or *undulatum*
abundant in open places
82 *Styphelia malayana* (Jack) J.J. Sm.
very common
83 *Catopyrum glaucum* Roth
common
84 *Lycopodium connivum* L.
abundant

2 82a *Dacrydium beccarianum* var.
subulatum Correa

common Shrub 3 m tall

75-100 m.

mim Jack. shrub 1-2 m. tall

small tree, about 8 m. tall,
wings of fruit reddish

flowers yellow

plant red, leaves appressed
to ground, flowers pink.
caespitose, culms
ascending to erect.
caespitose.
Triostularia undulata (Thw) Kern
caespitose.

shrub 2 m. tall; flowers
white, fruit red, fleshy.
shrub, sap orange,
flowers maroon.
rhizome creeping, somewhat
buried, stem erect,
branching somewhat distichous
in sterile shoots.

July 6 - Balis Park
 thin scrubby forest
 on dissected sandstone
 at top of cliff.
Eugeissonia

"Padang" on top of sandstone
 plateau is an open scrub
 of irregular height,
 1-4 m. occ. slender taller
 trees, with generally
 a thick herb layer of
Lycopodium cernuum,
Gleichenia linearis,
Cladium & many other
 herbs. (photos)
 Also ant mbraceae (photos)

When a rock ridge
 borders the padang there
 is dense forest of mostly
 small trees, max. 3 dm. dbh.
 very closely spaced, with
 much *Eugeissonia* with
 terrible flat reflexed spines
 on petioles. Also a curious
 acanthaceous palm with
 undivided plicate leaves.
 oblongolate. (photos (not))

A layer of tough peat
 covers the ground,
 filled with roots. Rattan.
Dacrydium & *Casuarina* common.

In some open areas,
Dacrydium besseae is
 a shrub 2 m. tall and
 forms an open scrub.

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Ad. from No. 59

- 43785 *Burmannia coelestis* Don
occasional in moist open places.
3 86 *Hydrophyllum coriaceum* Beck.
very common, epiphytic

- 1 87 *Rhynchospina rubra* (Lour.) Makino
rare, in trail
1 88 *Pteris Polystichum alternifolium* (Vahl) Meld.
common
4 89 *Cinnamomum kibertiae* Correa Cogn.
common
2 90 *Gleichenia linearis* (Lam.) Brumf.
abundant
4 91 *Lindleya (ortsteins) ensifolia* Sw.
abundant along trails and
in open spots on fine white sand
4 92 *Glossyadium Brunneum* Hook. f.
rare
2 93 *Baeckea frutescens* L.
locally abundant

same - "heath forest" on
sandstone ridges

- 3 94 *Psychotria*
~~Psychotria~~
3 95 *Psychotria gaertnera vaginalis* (DC.) Val.
2 96 *Mapania cuspidata* var. *petiolata*
very local

163

flowers purple, tips pale
green, turning dark purple.
tubercles 1 dm. diam., filled
with galleries, ant
very numerous. flowers
white.

culms spreading.
shrub 2 m. tall.

shrub 3 m. tall,
ripe fruit black.
forming low tangles.

rhizome buried; panicle
strictly erect.

small tree, 4 m. tall, fls. pale
green, fruit almost white;
leaves white beneath with
reddish midrib
shrub 1 m. tall; leaves
aromatic when crushed;
flowers white, tiny.

wine, climbing to
shrubs; flowers greenish white.
~~small shrub, 2 m. tall.~~

same - mixed Dipterocarp forest
on steep slopes

43797 sub. *Lasiandra*
rare

2 98 *Antocarpus amisophylloides* Miq.
~~large~~
Babo National Park, Teloh Assam
~~same -~~ ^{on} wet rocks
at base of cliffs

99 aras.

very common

43798 same - island flat at
mouth of estuary
Sonneatia ^{varia} ~~casuarina~~ ^{J. Sm.}
forming open forest on sand
inundated daily

2 01 *Ischaemum muticum* L.
abundant in edge of scrub
at top of beach

2 02 *Hibiscus tiliaceus* L.
common in scrub

3 03 *Vitex pubescens* Vahl
one tree in open grassy place east of
Scutellaria ^(Gaertn.) Roxb.

2 05 *Wedelia biflora* (L.) DC.
very local in openings

3 06 *Cyperus strobiliferus* Retz.
forming thin sod at and below high tide & wet

shrub 2 m. tall.

dried leaves on ground under
very large tree.

4 m

0 m. tree 10 m. tall

prostrate, forming mat,
tips of culms ascending.

tree 6 m. tall (others taller),
flowers yellow, nodding,
not fully opening
even in afternoon.

small tree 5 m. tall;

flowers purplish; fruit immature,
much branched shrub
4 m tall; flower pale purple;
fruit white.

sprawling herb; rays
yellow.

rhizome and ~~tulbs~~, tubers deeply
buried, rosettes exposed, culms ascending.

July 7 - Lang To Bong - a rugged sandstone mountain on a peninsula.

Lower slopes secondary. flats at bottom are in coconut plantation.

Also on flat ground an open scrub of *Rhodomyrtus tormentosa*. Across a small stream is a steep cliff along one side of the stream ravine. Above this on the more or less gentle slope is a rubber plantation, very run down and neglected, but with a good fern flora. A few native trees mixed with the Hevea.

Polyodium aff. *spectabile* but with short erect rhizome is locally common.

Along a stream ravine in sandstone rock ferns are abundant. This ravine contains native thickets, incl. a pink-flowered banana. On this a very fast moving pseudoscorpion.

Several ferns below some *anthocyanis*, and

Lang
To Bong
River

a *Lycopodium*, a *Dipteris*, and a *Polyodium*?

The flat with the *Rhodo-myrtus* also has *Melastoma* and areas of *Pteridium*. Very hot.

Trif. in small boat back to Kuching - Channel east from Lang To Bong is between mangrove swamps mainly an closed canopy, at least close to river, of *Avicennia*, with a thicker understorey of green, not clear what. *Sonneratia caseolaris* fringe. Creek part rather gray-green but just above high tide horizontal branches with greener leaves. This on convex side of large bend. On opposite side, Nipa with various trees. (acc. Kortenmann this on natural levees.)

As river straightens ~~this~~ Rhizophora assumes dominance on both sides with some Nipa and some other things. This swamp is of low stature 4-5 m t few emergents, mostly *Avicennia*.

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1963. Barnes - Sarawak

Santubong
July 7 - [Lang To Bong]
about 10 mi. north of Kukling

43807

Hedyotis cf. paniculata Wall.
common along trail in hot
sand flat in open scrub
of *Rhodomyrtus*.

same - in undergrowth in
neglected rubber plantation
on sloping sandy and rocky ground.

100 m.

3 08 *Lycopodium digitatum* (Burm.) Sw.
occasional

1 09 *Schizaea dichotoma* (L.) Sm.
rare

2 10 *Lycopodium cf. longifolium* (Willd.) Sm.
occasional

1 11 (fern) *Taenitis blechnoides* (Willd.) Sw.
very common

4 12 ~~Polypteron~~ *Tectaria plataniifolia* (Mets.) Copel.
common

2 13 *Lasiandra chrysanthemum* Ridl.
rare

3 14 (aroid) *Homalomena angustifolia* (Jack) Hook. f.
common on rocks in small stream

same - in deep moist ravine
in sandstone

7 15 *Sauvagesia*
rare

6 16 *Trichomanes javanicum* Bl.
common on wet sandstone walls

5 17 ~~Polypteron~~ *Cyclopolis presiana* (J. Sm.) Becc.
common on sandstone wall (top. 172)

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2 m. flowers white.

twiner, climbing on small
trees, young growth green.

twiner climbing on small
saplings, sterile; young
growth purplish.
rhizome short, erect.

- rhizome short, erect or
nearly so. fronds crowded.
slender shrub 1.5 m. tall,
fruit bright blue, fleshy.
spathe white.

slender shrub 3 m. tall,
branches drooping; inflo-
rescence pink, tending to be erect, fl. pink

fronds pendent

as river bends to left
Avicennia becomes dominant
on left bank. Nipa and
Rhizophora on right.

Then an area of possibly *Ceriops*
~~Ceropales~~ sp. Then in
straight river mixture
of Nipa and Rhizophora,
some Avicennia, Ceriops

Upstream, still straight,
Nipa more abundant along
river bank, but trees abundant
back a few yards, said to
be growing on mud, but
very slightly higher than
the Nipa.

Then on left some heavy
silt soil about 1.5 m above
h.t. This has houses

On upper river there are areas
where at high tide level is a
dense stand about 1 m. or more tall
of *Brownlowia tenua* (photos b-w)

Two species of Avicennia
Water very salty.

Junction with Sarawak
River.

(*Brownlowia tenua* flower-
calyx somewhat ~~more~~ reflexed,
old-rose color. stamens well-
exserted, bright yellow.)

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1963 Borneo - Sarawak

(from p'69)

same - neglected rubber plantation

43818 *Dipteris*

common on ground

19 *Polypodium?*

rare, on ground

July 7 - Sanggau Bony River 0 m.
between Sanggau and
Sarawak River.in edge of mangrove
swamp.6 20 *Avicennia officinalis* L.
occasional12 21 *Brownlowia tessa* (L.) Kost.
abundant, forming a
solid layer at high tide
level in certain areas

173

young fronds purplish.

young fronds purplish.

tree 10 m. tall; buds
blackish.shrub, emersed part
at high tide 1.5 m. high,
leaves bronze beneath;
flowers with calyx lobes
somewhat reflexed, old-rose
in color, stamens erect,
bright yellow (material
mostly dry in bud).

July 10

July 10 - Arboretum, Semengoh
Forest Reserve

60-90 m.

in mixed Dipterocarp forest.

11 22 ~~Capparis~~ *Axinandra*
rare *Axinandra coriacea* Baill.12 23 *Argemone mexicana* var. ^{tenuifl.} *premna*
rare13 24 *Fagraea Ternstroemia magnifica* Steff.
climber14 25 *Aglaia oblonga* *unifoliata* Ridl.10 26 *Mysticetus cinnamomeus*
Innes Bl.tree about 25 m. tall, 2 dm dbh,
base trunk.

shrub 1 m. tall

vine, 20 m. long, flowers
cream, turning yellowish.
small tree, fruit fleshy,
subglobose, orange red.tree about 30 m. tall
peeled blackish bark.

(to 78)

July 10 - trip Kuching to Lemengoh Forest Res.

Leaving Kuching - various stages of second growth. Then cleared peat swamp with rubber plantation some Diptera, etc. emergent left. Melaleuca introduced and spreading.

Mostly higher ground and various stages of second growth. Patches of Imperata.

A few low hills of deeply weathered intrusive rocks. mostly rolling land of Ban formation.

Arboretum: around h.g. some Gmelina arborea, planted to shade young Shorea.

High mixed dipterocarp forest on slope. Trees of all diameters and heights, to dbh + 40 m. tall. The canopy is very irregular, no one layer nearly complete, but in toto complete emergent trees very common (photos - b+w from 30, 50 & 80' + b/w from 30')

Epiphytes (vascular) general but few at all levels. Crustose lichens abundant.

moss scarce. General xerophytic aspect in topmost trees. Lvs. small but not microphyllous. Black ants running up and down topmost branches.

(photos b+w + b/w from 100')

Coll. from tree 2298. Amanthus.

The shrub layer 1-4 m. moderately dense, no obstruction to walking except where are rattans and other young palms.

Herb layer very sparse except in low bottom-land areas, where there are a good number of many sorts of herbs.

Occasional large aculeate epiphytic Pandanus. Similar or seen on ground.

Senengoh

July 10 - trip Semengoh & Ban
Secondary thickets
and pepper plantations,
giving way to rubber
plantations and thickets.

Crossed Sarawak River
at Batu Kitang. This
village was completely
submerged by flood
in Dec. to March 1962-3.

After this much rubber
with some small thickets
and patches of secondary
growth.

On hills torn up
by gold mining solid
secondary growth - Imperata
mosan

Bau limestone hill -
Cockpit type of basin,
with very sharp gullied
erosion. Gentle parts
covered by tall forest, except
flat bottoms which have
been cleared.

Steeper slopes covered by
a scrub of shrubs of various
sorts covered with lianas.
Some small pandanus.
Cliffs with generials,
etc. Some of these have
been burned over.

A few trees in scrub on
steep slopes.

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July 10 ctd. from p. 173)

- 43827 *Trichomanes* cf. *cupressoides* Desv.
rare on forest floor
- 1 28 *Schizaea* *dichotoma* (L.) Sm.
rare on forest floor
- 4 29 *Hanguana malayana* (Jack) Merr.
rare on forest floor (near tower),
- July 10 Ban Hills, south of Kuching
on vertically eroded limestone
- 1 30 *Grammitis*
rare on rocks
- 4 31 (Gesner.) Bowie? *Paraboea clarkei* B.L. Burtt
common on cliffs
- 1 32 *Pteranthus* *Pterisanthes*
rare
- 1 33 *Podocarpus neriifolius* Don
rare
- 2 34 *Asterolasia rubiginosa* Vent.
rare
- 6 35 *Cryptandra* cf. *oblongifolia* (Bl.) C.B. Cl.
common
- 5 36 (Hita.) *Tetrastigma*
rare
- 10 37 *Antidesma rotundata* M.-A.
- 4 38 *Begonia holtumii* Fransch. vel aff.
occasional
- 6 39 *Rinorea glandulosa* (Ehm.) Merr.
rare
- 1 40 *Grammitis*
occasional, epiphytic on shrub trunks
- 7 41 (fern) *Pyrosia numulariifolia* (Sw.) Ching
very common climbing on rocks and tree trunks,

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dark green.

large rosette, inflorescences
lying on ground,
fruits vermillion.

flowers white.

wine, fruits immature.

(brought by boy) sterile.

inflorescences and buds red.

wine; fruit fleshy,
scarlet when ripe.

small tree; fruit immature.

stems and main leaf vein
red-brown, flowers bright pink.
slender shrub, 2 m. tall,
fruit immature.

closely appressed & substrate.

July 11 - flight Kuching - Brunei
Follow friend at side.

Left Kuching 12:13

Largely rubber with
swamp forest and mifra
along tidal rivers. Patches
of pepper garden close to
Kuching.

Mifra swamp is very
extensive, not merely
a fringe along river. Some
trees scattered in it.

Away from rivers are
patches of forest, and
some shifting agriculture
and second-growth where
there is slightly higher
ground.

Great pattern of meandering
rivers like a salt marsh
on a gigantic scale.

Sadong R. - Coconut planta-
tion on ~~the~~ flat ground,
formerly peat swamp.

Sea off shore very muddy.
Coast lined with mangrove
to some width. Back of this
a ~~wide~~ strip of forest, about as wide
Mangroves are here dominated
by Avicennia also.

Back of forest strip land
largely cultivated

12:20 left coast. Sea is muddy.

12:21 passed mouth of Batang Lupar

Visibility very poor.

12:25-39 - winding estuaries
to be seen in distance.
Saribas River.

Rivers tend to have
tributaries that meander
with general direction
parallel to coast, not far
back of coast.

12:31 Approaching coast again.
near Pg. Jenjeh.

Some cultivation just
back of coastal swamps,
but very local.

12:37 Two large rivers with
a very extensive tidal pattern.
Mangroves ~~are~~ along
channels, peat swamps
away from them

12:35-40 A tremendous network
of tidal channels enclosing
blocks of peat swamp and locally
some herbaceous vegetation -
perhaps old cultivation on
slightly higher ground
where the peat was very shallow.
These form concentric rings
around swamp areas and
inside mangrove belts.

Peat swamp is brownish
and fine textured, where
there has been disturbance
texture is coarser - broken off
crown. 12:40 no more visibility.

1:02 Glimpsed of coastline - absolutely straight - forest not clearly seen but said to be solid *Casuarina equisetifolia* all along beach, peat swamp behind it.

1:12 coastline in distance, mostly with sand beaches, some small cliff-like points.

1:20 Tanjung Similajau Long sandy beach (with a rounded end to S.E.) Backed by great expanse of peat swamp. Very shallow water close & slow. Only a few very small rivers here. Mouths seem to swing to N.W. along coast, separated by narrow or wide spits. Some clearing well back, extending to almost the beach locally (1:26). A low wave-cut cliff for some distance. Low hills, well wooded and with abundant erosion scars, extending both from it.

1:22 Road along coast, turning inland, old timber road.

1:27 Mini rather diffuse town. New road being built to Kuching - awful gas! 1:34 Blairst river I have seen, small, meandering

through enormous area of peat swamp - mostly dominated by a grayish tree, prob. *Shorea albida*. Some parts evidently a pure stand.

1:35 Baram River. - brown. Variation from area of solid *Shorea albida*, thinning out to very mixed forest with little or no *Shorea albida*.

1:37 Balait R.

1:39 railroad ~~to~~ through very even forest, but with large patches with no trees - killed by caterpillars? (to be visited tomorrow)

1:42 Andulan T.R. with vast area of mixed Dipterocarp forest. Some trees (will visit this) flowering.

Becomes rather hilly with more and more shifting agriculture (old lake mainstream in distance. (natural shallow lake)

1:44 Tutoong River. Much clearing along it.

Then forested hill, - mixed Dipterocarp with some patches of secondary growth. Somewhat hilly.

1:46 patches of pasture
with cattle trail (water buffalos)
much cultivation along road.
long straight ridges with
mixed dipterocarp forest
Limbang R. beyond them.
These ridges parallel to
road and cause.

large clear area, partly
in wet rice, along road down
course.

Then a hilly area with
mostly patches of secondary
forest & cultivation.

1:50 Brunei to right.

Mosaic of secondary
growth on small hills.
Scattered houses on road
out of Brunei, beyond airport.
scraps of good forest here
and there on hills. Mostly
secondary. Some rubber
plantation.

1:54 arr. Brunei airport.

Brunei - feria by bus.

magnificent mangroves and trees
on pilings.

Rubber!

Small swamps of Pandanus
& ~~Pisces~~, mangroves.

Just out of Brunei.

Old fruit plantation
with enormous mangifera, etc.
thick undergrowth, mainly
seedlings + small shrubs.

Kalanas - photos of Mangifera
sp. + Durio sp. (b+w)
Musa sp. in secondary
thickets.

Photos of Kedayan rice store
houses (b+w)

Road cuts ~~thru~~ three tilted
beds of shale and sandstone
of different colors + hardness.

Tutong River - photos (b+w + Kodak)
of *Hemitelia globosa*.

Then a swamp of Combretum -
carpus scattered over a
continuous shrub layer
of Loraine
(b+w.) photos.)

bet Telisai & Dangai Liang
B & W photos of raised
sand road out

- July 11 - just outside Brunei
 43842 *Fchizaea dichotoma* (L.) Sw.
 common in dense old plantation
 of large fruit trees
 2 47a *Ophiorkhegys*
^{same} July 11 - Kalanas

- 4 47 *Mussaenda coccinea* Staph.
 in secondary thickets and
 hedgerows

July 11

~~in~~ in sparse scrub vegetation.
 on low ridge of white sand

- 1 44 (lab.) half buried in sand
 flower purple.
- 1 45 *Diosidea Hedyotis* cf. *pinifolia* Wall.
 common on bare sand
 flower white.
- 2 46 *Calophyllum obliquinervium* Hend. & W.-S.
 common
 shrub 4 m. tall,
 flower white.
- 1 47 *Timonius flavesens* (Jack) Balser
~~rare~~
 shrub; fruit immature
- 2 48 *Ormosia banksana* (Miq.) Blain
 occasional
 small tree 5 m. tall;
 seeds scarlet.
- 4 49 *Glochidion celastroides* (N.-A.) Pax
 common
 shrub; leaves almost
 white beneath, flowers
 greenish, white, fragrant.
- 7 50 *Ingenia ampullaria* Staph
 occasional
 small tree; flowers white.
- 2 51 (temp) *Tristania ovalata* R. Br.
 common
 shrub 1-1.5 m. tall,
 flowers yellowish.
- 3 52 *Canthium didymum* Gaertn. f.
~~rare~~
 small tree, leaves
 apparently distichous.

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1963 - Bonnes - Burnei

- 43853 *Psychotria obovata* Wall.
occasional
- 54 *Vaccaria ampliprosopa* Brum.
rare
- 3 55 *Hypolechia malayana* (Jack) T. J. Gm.
common

July 11 - bet. Telisai and
Lungai Liang

- 56 *Fimbristylis schoenoides*
rare in wet grass along road
in white sand

July 12 - ~~just~~ just south
of Seria

in peat swamp dominated
by *Shorea albida*

- 57 (sub) *Lecananthus erubescens* Jacks.
rare on floor of forest
- 58 *Ficus deltoidea* var. *molliegyna* (Rig.) Corner
rare on floor of forest

- 3 59 *Poikilospermum*
rare in secondary thicket
at edge of primary forest

- 60 *Nepenthes bicalcarata* Hools. f.
at edge of grassy thicket
~~rare~~ in railroad clearing
in primary forest

- 61 *Shorea albida* Lym.
dominant in forest

- 4 62 *Asplenium longissimum* Bl.
common on forest floor

- 3 63 *Quercus lithocarpus* Sundaceus (Bl.) Rehd.
in secondary thicket in edge of clearing

191

climber, fruit white, fleshy.

shrub, flowers vermilion

shrub to 1 m. tall. flowers
white, fruit orange-red.

semi-prostrate shrub

erect shrub 1 m. tall.

depressed shrub.

spherical heads bright
purple.

sprawling climber 2 m. ^{long}
~~sootongon~~ supported

by grass, flowers
green, turning red. ^{stone} striate.

leaves, fruits and
seedlings on floor of forest.

fronds rarely rooting
at tips.

trees 5 m. tall.

- #3 July 12 - in middle of
Badas swamps, s. of Seria
in peat swamps forest
on deep lens-shaped
peat body
- 43864 (sub.) *Lecananthus emarginata* Jack
4 on fallen logs and peat
- 3 65 *Ficus deltoidea* var. *motleyana* (Miq.) Corner
in edge of small opening
(probably opened by lightning)
- 1 66 *Tarenna* ~~fragrans~~ (Bl.) Ridd. * Val.
rare in shrub layer
- ? 1 67 *Psychotria*
rare in shrub layer
- 7 68. *Clerodendrum fistulosum* Benth.
rare in shrub layer
- 2 69 *Melastoma malabathricum* L.
common in railroad clearing
- 6 70 *Timonius* ~~pedunculatus~~ ^{Salicifolius} ~~Ridl.~~ Val.
common in secondary
thickets at edges of railroad
clearing ^{flavescens} (Taub.) Balser
- 4 71 *Timonius* ~~flavescens~~ ^{pedunculatus} (Wall.) Ridl.
common in secondary
thickets at edges of
railroad clearing

subprostrate shrub,
flowers white.

- erect shrub 1 m. tall,
fruit immature.

shrub 1.5 m. tall; fruit
immature.

shrub 1 m. tall.

stems with swollen
internodes, in which
ants live; calyces magenta.

shrub 1 m. tall,
flowers deep rose pink.

shrub 2 m. tall,
flowers whitish, stamens

shrub 2 m. tall, fruit immature.

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1963 - Borneo-Brunai

July 12 - Badas

on sandy soil at edge of
peat swamp

- 43872 *Pithecellobium angulatum* Bl.
common in ~~so~~ thickets
at edges of railroad clearing
? 73 *Hedysotis cymbosa* (L.) Benth
occasional on open sand
around buildings

~~24 moss.~~same - on ~~sedges~~ in Agathis
forest on white sand ridge.

- 2 74 (moss)
on ground

- 2 75 (moss)
on ground

- 1 76 ~~Worphyllum~~ + *Gastraea vaginans* (DC) Merr.
in undergrowth

- 2 77 *Lunuanga carnifolia* Tanakha
in undergrowth
~~ityaphylla~~ Brem.

- 2 78 *Ixora salicifolia*? *propintha* Brem.
occasional in undergrowth

- 2 79 (myrs.?)
occasional in undergrowth

- 1 80 *Psychotria*
rare in undergrowth

- 1 81 (lab.)
rare in undergrowth

- 3 82 (anon.) *Diospyrum anomale* Hochst.
rare in undergrowth

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much branched tree
about 5 m. tall; pods
bright orange, seeds black.
flowers white.

shrub

large shrub,
fruit turning yellowish,
aromaticslender shrub, sparingly
branched; flowers orange red.slender shrub,
fruit pale green.slender shrub 2 m. tall;
inflorescence very fleshy,
pink, fruit black soft.slender erect unbranched
shrub, raceme cauliflorous,
flowers dark red.small tree; calyx purple,
stipes turning reddish.

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~~43882~~ *Degeneria baccata* var. subulatum (Carr.)
common

43883 (Mys.) *Ardisia crassa* Claire
rare in undergrowth.

1 84 *Polygonum*

rare in undergrowth

1 85 *Erythroxylum cuneatum* (Miq.) Kurz
rare in undergrowth

2 86 (Loph.) *Agrostistachys leptostachya* Pax & Hoffm.
rare in undergrowth

same - on sand ~~along~~
 railroad

1 87 *Spermannia suffruticosa* R.Br. ex Bent.
common

same - in open shrubby
swamp along Belait River

3 88 ~~Hoseanthus~~ *lobbianus* (Ridl.) Meiss.
common climbing in
shrubbs and small trees

3 89 *Scleria*
common in slightly
raised places in mud.

July 12 - *Scleria*, in
grassy edge of peat
swamp.

7 90 *Cordia cylindrostachya* Roem. & Schult.
common (said to have
been introduced recently)

shrub 3 m. tall

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flower pinkish white.

flowers with wings
purple, keel white with
bright orange distal portion.
fruit scarlet, fleshy.
fruit immature.

flowers pinkish white.

uninundated at high water

liang; bracts and
corolla a striking
orange, stamens ~~and~~ fruit
maroon.

culms erect or ascending,
2 m. tall.

shrub 1.5 m. tall,
spikes tending to droop;
flowers white, fruit red.

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